EXAMINING THE EFFECTS OF SCHEDULED COURSE TIME ON MATHEMATICS ACHIEVEMENT IN HIGH SCHOOL STUDENTS

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Dissertation Prepared for the Degree of

DOCTOR OF EDUCATION

UNIVERSITY OF NORTH TEXAS

May 2007

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Mallory, Kelli D. *Examining the effects of scheduled course time on mathematics achievement in high school students.* Doctor of Education (Curriculum and Instruction), May 2007, 341 pp., 244 tables, references 57 titles.

This study was designed to determine the effects of two different schedule types on mathematics achievement in public high school students. The instruments used included the Texas Assessment of Knowledge and Skills, given annually to all students in grades 3 through 11, the Texas Algebra I end-of-course examination, given as a district option to Algebra I students, and student final course grades as determined by classroom teachers. The study compared students' performance in these three areas during the 2004-2005 academic year in one suburban school district in North Texas. The study considers the type of schedule, either traditional or 8-block, between students in teachers' classes who teach the same course on both schedules concurrently. This study also investigates a qualitative aspect by including a short opinion survey of teachers' perceptions regarding student academic performance, teacher satisfaction and retention, and the ability to accomplish curricular goals.

Findings from this research suggest course schedule does not have significant effects on student academic performance as measured using analyses of covariance comparisons with a 0.05 alpha-level, leading to the conclusion that a particular course schedule does not adversely impact student performance on academic measures. However, in some comparisons conducted within the course of the research, statistically significant results emerged. Qualitative data generated from a survey of teacher perceptions regarding the benefits of the two scheduling types, traditional 50-minute verses alternating day 8-block, suggested teachers preferred a traditional schedule over

that of a block schedule design. Most teachers who responded to the survey instrument expressed the perception that traditional daily meeting classes allowed their students to be more successful.

Additional research into the effects of scheduling types on students academic performance are suggested and would include examining larger population samples, a narrower study of specific courses within the field of mathematics, or an expansion of the content areas explored to fields such as science, languages, or non-academic core subjects, including the fine arts.

ACKNOWLEDGMENTS

This dissertation is dedicated to my family, in particular my husband David Potter, for without their ongoing support and understanding I would not have achieved this honor. I wish to thank Pamela Esprivalo Harrell, my major professor, for her high standards, patience, and the countless hours she invested in helping me to make this research successful and meaningful. I also would like to thank the other members of my committee, Dr. Jane Huffman and Dr. James Laney, whose insight and recommendations are without measure. I appreciate all the friends and family who encouraged me to keep going, even when it seemed like this work would never be finished.

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CHAPTER 1

INTRODUCTION

As early as 1892, educators have contemplated the effects of time and its structure on the academic achievement of learners. Prior to 1892 and the meeting of the National Education Association's Committee of Ten, early high schools and Latin grammar schools allowed for flexibility in the use of time. Classes were structured based on the material to be covered and the time it took to learn, and not by bells and clocks telling students when to change classes and content. And still, after the convening of the Committee of Ten and some amount of school restructuring, subject matter instruction continued to be flexible, often offered on a two, three, or four-day week schedule to allow for student learning to be maximized in the time structure.

However, time schedules began to change in 1909 when the College Entrance Examination Board adopted the Carnegie unit and standardized school schedules. Beginning in 1910, schools were mandated to offer a total of 120 hours of class instruction for each course, to be delivered in 40- to 60-minute class meetings during an academic year of 36- to 40-weeks in length. Based on the ideas of the scientific management era, this effort sought to help students learn a greater variety of material and graduate under similar circumstances regardless of where schooling occurred.

Since 1909 the pendulum, like in other areas of educational thought, has continued to swing back and forth. The 1950s brought forth a movement for increased flexibility, dubbed as flexible modular scheduling which peaked in the early 1970s with about 15% of high schools following this approach. Flexible modular scheduling involved the elimination of the more rigid, traditional structure of class meetings and replaced it with the idea that class time should be varied, based on the instructional needs of the students and the subject matter. The look of the schedule then might involve some classes with short meetings of one module of about 20 minutes while other classes might need to meet for a longer period of time, such as 40, 60, 80, or 100 minutes. Within the flexible modular scheduling structure, classes would convene in multiples of 20-minute periods for as long as necessary that day or week (Trump, 1959). By the later 1970s and the 1980s, the pendulum had swung back to a more traditional time structure following the Carnegie unit plan. The Carnegie unit was based on a proposal from the Carnegie Foundation of a standard unit with which to measure high school time. Each subject would convene for a total of 120 hours per year, would meet four to five times per week for a length of 40- to 60-minutes each meeting over a period of 36- to 40-school weeks. Upon completion of these time requirements in a subject, students earn one unit of high school credit. These credits are then totaled together to form state graduation requirements usually consisting of 21 to 28 credits over the various academic subjects (Boyer, 1983).

With the writing of *A Nation at Risk* (NCEE, 1983) schools, however, began a push for reform and restructuring. These efforts began to shape innovations in time scheduling for schools. The momentum for time reallocation gained impetus by the mid 1990s when two national studies were released: *High School Restructuring: A National Study* (Cawelti, 1994) and *Prisoners of Time* (NECTL, 1994). The National Education Commission on Time and Learning report, *Prisoners of Time* (1994) evaluated the allocation of time in schools and noted several important observations.

1. Schools open and close their doors at fixed times.
2. The school year generally lasts nine months.
3. Most schools offer classes on a six period day lasting six and one-half hours.
4. Class periods are approximately 50 minutes in length.
5. A school year is 180 days.
6. Graduation is determined by fulfilling seat time in terms of Carnegie units.
7. Teacher salaries are generally determined based on length of service and graduate coursework.
8. Little attend is paid to how actual time is spent.

Overall the commission's report called for public schools to restructure how high schools use time for learning. "In the school of the future, learning – in the form of high, measurable standards of student performance – must become the fixed goal. Time must become an adjustable resource" (National Education Commission on Time and Learning [NECTL], *p* 31). Statements such as these led school administrators to evaluate the merits of block scheduling techniques and what time restructuring could offer schools as an answer to the question, how do we improve the academic achievement of our students? Since the release of *Prisoners of Time* many reform efforts have focused on how to alter the amount of time available for learning (Ballinger, 1992; Barrett, 1991; Bloom, 1974; Carroll, J.M, 1994, NECTL, 1994). Other reform efforts have investigated the instructional methodologies and techniques used in the classroom in an effort to make better use of the teaching time available (Watts & Castle, 1992; Carroll, 1963; Cotton & Savard, 1981). Best put by the National Education

Commission on Time and Learning, “Both learners and teacher need more time – not to do more of the same, but to use all time in new, different, and better ways (*p*. 7).”

In an article published in the *American Psychologist (1974),* Benjamin Bloom weighed in on this very matter, asserting that some students need additional time to achieve the same level of mastery. Rather than promoting the lengthening of the school year as some researchers propose (Ballinger, 1992; Barrett, 1990) Bloom suggested providing opportunities for extra hours of instruction during the regular school day and school year. He asserted that “these hours of extra time and help rather than years of extra time and schooling” would have a greater result on learning and student achievement (1974, *p*. 687).

One dissenting opinion against block scheduling might be to investigate ways to make better use of the time currently spent in traditional classrooms, rather than looking for the answer in the allocation of additional class time. In a study of urban Michigan classrooms by S. Huyvaert (1992) of the actual minutes of class time used for instruction, she found that of the total 1080 hours of instructional time available during a normal school year and day, only a fraction of that time is spent with students engaged in learning or on task. Huyvaert (1992) estimated that on average students were involved in learning only 30% of the time and that the remaining time was spent on other mundane tasks such as role taking, discipline issues, checking work, etc. Stehno (1985) also conducted similar studies of students in rural Kansas classrooms of how time is spent. Recording in number of minutes of how class time was spent, she found that students were involved in on task learning opportunities only about 34% of the time. Indeed, if these wasted minutes were transformed into student time on task then the learning impact for students may be greater than seeking the answer in an overhaul of the school bell schedule (Watts & Castle, 1992).

Knowing that some students require more time than others to master certain material is not new information to veteran members of the teaching profession, however, most will also argue that it is the quality of the time and instruction that makes the difference with students, not the quantity (Carroll, 1963). In a study conducted by Cotton and Stavard (1981), after reviewing 35 other studies of student achievement and the relationship to time, they found only a small relationship connecting student achievement and a longer school day or calendar year, yet found stronger positive relationships when comparing achievement and actual time spend in engaging and 'on-task' learning. This information would seem to point school administrators toward increasing the quality of time in their schools rather than focusing on the quantity of time. However, much of the professional literature on improving the use of classroom instructional time continues to focus on professional development for teachers teaching on longer blocks of time (Gilkey & Hunt, 1998; Robbins, Gregory & Herndon, 2000; Barnes, 1998; Hackman, 2004; Canady & Rettig, 1996) instead of on more efficient uses of traditionally allotted class time.

Ironically, it was the *Prisoners of Time* report in 1994 that prompted most school officials to begin looking at alternate means of time scheduling as opposed to how time was being utilized on the current scheduling plan. One recommendation made by the commission was to "fix the design flaw" (*p*.22, 26-27) in schools and to "use time in new and better ways" (*p*.22, 26-27). Within the text of this recommendation came the suggestion of block scheduling, that it might offer an increased flexibility of time that the commission was suggesting, while also promoting team teaching, allowing for a better integration of technology into the classroom given greater time blocks, and increasing the use of community resources in the classroom instruction. The hope was that block scheduling innovations would not only redistribute time to allow for more quantity, but that the quality issue would also be solved when utilizing greater blocks of time for learning.

As more and more schools move toward the use of a variety of block scheduling techniques, little more than anecdotal evidence and personal stories exist today to justify their use as a means to increase student achievement. Canady (1999) estimated that by the year 2000, 50% of all high schools would be using some form of block scheduling. A statewide study by the Texas Education Agency conducted during the school year 1996-1997 indicated at that time 43% of public high schools in Texas were using some form of block scheduling in their programming. But the question still remains: Does offering classes on any form of block schedule improve the academic achievement of students?

Purpose of the Study

The purpose of this study is to compare the academic achievement of high school students taking mathematics courses, including Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement on one of two scheduling plans, an alternating day block class meeting of 90 minutes every other day and a traditional class meeting of 50 minutes every day. Student academic performance was measured by the

Texas Assessment of Knowledge and Skills, student course grades, and the Texas Algebra I end-of-course examination.

Statement of the Problem

While the restructuring movement has caused many high schools to investigate block scheduling as a partial solution for meeting the needs of learners, no clear evidence exists to support claims that the implementation of block scheduling improves students' academic achievement. Although there are other studies about block scheduling in both the US and in Canada (VanMondfrans, 1972; Davis-Wiley, 1995; Pipsia & Westfall, 1997a; Thomas, O'Connell & Raymond, 1997; Calvery, Sheets & Bell, 1998), most studies focus mainly on the affective domain of climate, perception, and attitude, have small sample sizes that make generalizability difficult, or focus on variables other than students' academic achievement. Other studies found within the literature (Freeman, 1995; Veal & Schrieber, 2000; Nichols, 2000; Wild, 1998; Bateson, 1990; Raphael, Wahlstom & McLean, 1986; Raphael & Wahlstom, 1986; Lockwood, 1995; Edwards, 1995) do focus on the effects of block scheduling on achievement, but limit research to an examination of the 4x4 block schedule and 8-block methods. This study investigates the effect of the 8-block, 90-minute time block schedule as compared to a traditional 50-minute schedule on students' final course grades in Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement, statewide criterion referenced standardized tests (Texas Essential Knowledge and Skills) in the area of mathematics at the 9th, 10th, and 11th grade exit level, and the Texas Algebra I end-of-course examination within two high schools running both types of class time schedules concurrently. This affords school administrators research data about student achievement measures with which to make decisions regarding the conversion to or from block scheduling techniques that is beyond the scope of the current research literature available.

Research Questions

The questions central to this research study include:

1. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
    a. Is there a statistically significant difference for course grades between students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
    b. Is there a statistically significant difference for course grades between students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
    c. Is there a statistically significant difference for course grades between students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
    d. Is there a statistically significant difference for course grades between students taking Algebra III on a traditional 50-minute schedule and

students taking the same course, from the same teacher, on an 8-block schedule?

e. Is there a statistically significant difference for course grades between students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

f. Is there a statistically significant difference for course grades between students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

g. Is there a statistically significant difference for course grades between students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

h. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

i. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the campus level?

j. Is there a statistically significant difference for course grades between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

k. Is there a statistically significant difference for course grades between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

2. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th, 10th, or exit level 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

   a. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

   b. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Algebra II on a traditional 50-minute schedule and

students taking the same course, from the same teacher, on an 8-block schedule?

c. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

d. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

e. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

f. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

g. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

h. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

i. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

j. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

k. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

l. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

3. Is there a statistically significant difference in state developed end-of-course exam scores between students taking Algebra I on a traditional 50-minute schedule and students taking Algebra I, from the same teacher, on an 8-block schedule?

4. Is there a difference in teacher perception between the 8-block schedule and the traditional schedule?

a. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of student academic success?
b. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of teacher satisfaction?
c. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of teacher retention?
d. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of fulfillment of curricular purpose?

Definition of Terms

Block Scheduling – A school time scheduling technique where “at least part of the daily schedule is organized into larger blocks of time (more than 60 minutes) to allow flexibility for varied instructional activities (NECTL, *p* 23).”

Common forms of block scheduling include the following:

- 4x4 – A form of block scheduling where students are enrolled in four classes per semester. Each class meets for approximately 90 minutes per day, every day for one semester and students receive one credit for each course successfully completed during the semester, up to four credits per semester. The next semester, students enroll in four new courses. This form of schedule makes it possible for students to earn up to eight graduation credits in one academic year. Teachers generally teach three courses per semester with one 90-minute planning per day.

- 8-Block– Also dubbed as alternating day block or A/B block scheduling, under this plan, students enroll in eight courses per semester. Each class meets on alternating days for approximately 90 minutes in length. Students receive one credit for each course completed in the full school year and have the potential to acquire up to eight credits in one academic year. Teachers generally teach six classes per year, or the equivalent of three classes per day. However, this tradition is changing as the funding belts of local schools districts tighten. The growing trend is for teachers to teach the equivalent of seven courses per year, having a planning period of 90 minutes every other day, or an average of 45 minutes per day as required by law.
- Flexible block – A hybrid type of schedule that varies from school to school. Some offer a combination of blocked (90-minute) classes and traditional (40 to 60 minutes) classes while others run a block type schedule on certain days of the week and a traditional schedule on other days of the week. Many different modifications of block scheduling exist in this form, but all offer at least one 90-minute block of instructional time in the regular schedule to be called flexible block.
- Copernican Quarters (2x2x2x2) – An intensive form of scheduling where students enroll in classes that are on average two and one-half hours each in length. Each class is taught for one-quarter of the year, with two classes meeting each day, every day for about 9 to 10 weeks. Each quarter students enroll in two courses each for one credit and can earn up to eight credits per year.

Traditional scheduling – A schedule ranging from six to eight periods per day, each averaging 40 to 60 minutes in length and meeting daily all academic year. Teachers typically teach five, six, or seven periods as the number of classes varies and have off one period for preparation.

Texas Assessment of Knowledge and Skills. This test is the state developed and administered standardized test in Texas. Students are required to take the Texas Assessment of Knowledge and Skills test in mathematics annually beginning in 3rd grade and culminating at 11th grade. Students test in reading annually in grades 3 through 9, in writing in grades 4 and 7, in English-Language Arts in grades 10 and 11, in social studies in grades 8, 10, and 11, and in science in grades 5, 10, and 11. The test is aligned to the Texas Essential Knowledge and Skills. All state assessments undergo statistical testing in order to be considered both reliable and valid measures of student achievement on state standards.

Scaled score – The scaled score is the criterion-referenced measure of performance on the Texas Assessment of Knowledge and Skills tests. The scaled score is calculated for each student for each test taken. The passing standard on the assessment is set at various scale scores for each test in mathematics. This measure is based on an advanced statistical model using a combination of performance indicators including Rasch data. The same amount of effort is expected to meet the same scale score each year regardless of the passing standard.

Met standard – the scaled score necessary for successfully mastering the minimum expectations on the Texas Assessment of Knowledge and Skills. For mathematics the scaled scores for met standard in 2004-2005 are set at 2100 for 9th, 10th grade, and 11th grade exit level.

Commended performance – the scaled score necessary for mastering the expectations of the Texas Assessment of Knowledge and Skills at the 90% equivalent level. The scaled score for achieving commended performance on each mathematics test is set at 2400.

Texas Essential Knowledge and Skills – these include the state developed curriculum and learning standards required by all students in Texas public schools in Kindergarten through high school. Texas Essential Knowledge and Skills exist for every grade level up through grade eight and for all state credit high school courses.

End-of-course – End-of-course tests are developed at the state level, distributed under the supervision of N.C.S. Pearson, a contractor, and administered at the local school district in specified courses. The use of end-of-course tests is not required by the state of Texas, but is available as one option for assessment of student performance. The end-of-course tests are currently available for Algebra I, biology, U.S. history, and English II. The minimum expectation for meeting standard or passing for all end of course tests is 70% of the items or the equivalent.

Significance of the Study

This study has significance for school officials and administrators of high schools interested in increasing the academic achievement of students in high school credit courses and for those who are interested in investigating student achievement as it relates to scheduling options. The widespread demand for restructuring of America’s high school time schedules and for improvement in standardized test scores has prompted many high school administrators to implement some form of block scheduling in their local high school. This schedule is typically implemented in absence of scientifically gathered data that supports the notion that the scheduling method will, at a minimum, have no adverse affects on student achievement. The use of a block scheduling design is often more expensive than a traditional schedule type as well. Schools concerned with the expenditure of funds, particularly in the most expensive area of personnel and benefit costs to hiring the increased number of teachers needed to successfully implement a block schedule program, should examine evidence that the scheduling model will be academically beneficial to students. School administrators should weigh the benefits to student achievement against the cost of running such a schedule type. This study provides important data in the decision process of adoption of alternative scheduling tactics as preferred methods for achieving improved academic achievement in the mathematics.

Organization of the Study

Chapter 1: The first chapter introduces the research study and explains the significance the research will have in the field of time scheduling in secondary schools. The information included in this chapter sets up the study, provides the basic research questions that were investigated, defines the terminology specific to the research study, and introduces the reader to the significant role the research plays in the field along with the limitations of the study.

Chapter 2: The second chapter defines the field of current research surrounding the topic of school time scheduling. The material included within this section introduces the reader to the research literature regarding different forms of block scheduling, traditional scheduling, and a comparison of the different scheduling options. This chapter should establish that while research does exist on the topic of scheduling innovations in public secondary schools, more scientific comparison is needed between different scheduling types.

Chapter 3: The third chapter found within this study includes an overview of the proposed research and how data was designed, collected, and analyzed. Sections within this chapter include information on research design, sampling procedures, specific data collection procedures and the instruments used to collect the data, a plan for how the data was analyzed and reported, including specific data being scrutinized. An example would include details regarding reporting of data for whole group comparisons as well as subgroup populations. Limitations of the study for generalizing the data to other school settings and information related to the protection of human subject information are also included within this chapter.

Chapter 4: The fourth chapter included in this study describes, in-depth, the results of the investigation. This section includes the data analysis and findings of the study, interpretation of significant and insignificant results, and descriptive statistics resulting from the analyses of covariance conducted during the course of the data investigation. Anomalies in the data, irregularities in the data collection, and a presentation of the study data will be presented.

Chapter 5: The fifth chapter in the study includes conclusions that can be drawn from the data, a comparison of study findings to that of previous literature on the topic of scheduling, and implications of the data findings for future research. This final chapter summarizes the research investigated, describe how it contributes to the field of research in the area of secondary schools time scheduling, and provide for avenues of further research by others who wish to continue research into this topic.

CHAPTER 2

REVIEW OF RELATED LITERATURE AND RESEARCH

Historical Background

The current notion of alternative, flexible models of scheduling in high schools has existed in some form or another since schools began. Evidence documenting the more contemporary ideas of scheduling began in the 1950s with the flexible modular scheduling movement of the scientific management era (Trump, 1959). In this brand of scheduling option, the timing of classes existed based on student need and the time in which it took students to learn the content. Modules of time were built around 20-, 40-, and 60-minute intervals and parts of school days were blocked out to allow for student independent study, small group study, and whole group instruction.

While the flexible modular scheduling movement largely preferred the flexibility that the schedules offered (Goldman, 1983), data on student achievement under flexible modular scheduling produced widely mixed results. Additionally, in a review of the studies on flexible modular scheduling at the time, Goldman (1983) found that the problems and issues flexible modular scheduling created for schools far outweighed any positive effects it may have had upon students' achievement. Ultimately schools began to return to more traditional scheduling techniques in the mid-1970s, and by the 1980s, the flexible modular scheduling movement was largely abandoned. Making final commentary on the flexible modular scheduling movement and thinking about the possibilities of alternatives to traditional scheduling practices, Goldman's last comment might also be a lesson for today's block scheduling models:

> Some form of flexible, adapted scheduling is a sophistication which we probably cannot afford to overlook; the lesson to be learned from the FMS experience is that such flexibility must be real, must produce significantly better results than any system it replaces, and must not cause more problems than it solves. (1983, *p*.209)

In 1994 the National Education Commission on Time and Learning published its report *Prisoners of Time* in which the commission communicated findings of how time was allocated and spent in American public schools. Several recommendations were made by the commission on how to improve the use of time in our schools. One such recommendation was to "Fix the design flaw: Use time in new and better ways (pp. 26-27)." Block scheduling, or alternative scheduling methods, was listed as a way to increase flexibility in schools and to promote better teaching practices through the improved use of class instructional time.

In the same year, another report was published entitled, *High School Restructuring: A National Study.* This study conducted by Cawelti (1994) painted a larger picture of the high school restructuring movement of the time and the role that block scheduling could play within that movement. Of the five identified components of the high school restructuring efforts, including curriculum and teaching, school organization, community outreach, technology, and monetary incentives, block scheduling was listed as 1 of 10 indicators of restructuring activities, implying that schools that were in the process of restructuring for improvement would participate in these efforts. By this time the innovation known as block scheduling was already a topic of conversation so with the publication of two national studies in one year, schools were undoubtedly swayed to consider it a viable option for school improvement.

Arguably traditional scheduling patterns have faults. As described by Canady and Rettig in *Block Scheduling: A Catalyst for Change in High Schools* (1995), traditional high schools may seem impersonal in their attempts to educate vast quantities of students. Teachers must address the needs of 100 to 180 students each day within six or seven different classes on an allocation of as little as 40 minutes of instructional time. Coupled with increased demands related to graduation requirements, dealing with seven or eight different teachers as employers, moving around to six to eight different workspaces each day, it is a wonder students feel they are accomplishing anything at all in schools.

Traditional instruction is also thought to limit the instructional possibilities for students as teachers primarily use a lecture teaching format to get through the material in the short time span, causing the curriculum to be unconnected and shallow (Canady & Rettig). However, the actual allocation of time may not be the main culprit in hindering our student’s learning. Canady and Rettig (1995) surmise that the most important factor for academic success is the degree to which teacher’s alter instruction to better utilize the time allotted. Their research, however, does not consider that this would also be true in a traditional environment. Instead of applying all this energy to changing the way teachers use time on the block, perhaps the efforts are better spent educating teachers to be more efficient and effective with time regardless of the scheduling pattern.

Looking toward psychology as it relates to learning for answers, a phenomena of learning behavior related to this discussion arises. Drawing from years of study, Emptier and Farris (1990) uncovered what is known as the “spacing effect” from their research on learning in experimental psychology. The spacing effect implies that information presented to a learner in different time increments yields different results. They found that spacing or distributing information over time yielded better learning results than when that same information was presented all at once. On a block, students are exposed to a larger amount of information at once and then given class time to practice new skills. Since each class meeting is roughly equivalent to two class meetings on a traditional schedule, the assumption is that students receive twice the information per class session on the block. However, given the number of days per academic semester and the length of the school year, classes on a block schedule have fewer class meetings over the course of an academic year, resulting in fewer hours of instruction. On the traditional schedule, information is broken into smaller bits since class meetings occur daily. Would this spacing effect then not point toward traditional scheduling as one that might render better learning results from our students? “One of the most dependable findings from psychology holds up in classroom research: that ‘spaced’ practices over several lessons or study periods is superior to equal amounts of time spent in ‘massed’ practice. Indeed, two spaced presentations or practice sessions are about twice as effective as two successive massed presentations of the same length” (Anderson & Walberg, *p*.6). This very research is used as an argument in the debate over block scheduling as an offset to the argument by proponents, who in absence of hard scientific evidence, justify block scheduling by saying that students like it better and perform better under its use (Wild, 1998; Anderson & Walberg, 1993).

Proponents of block scheduling counter argue that one benefit of block scheduling is that teachers can delve deeper into subject matter content with the greater availability of time. But the trade off to this would be that in order to spend the blocked time getting deeper into the curriculum, that there must then be a reduction in the overall scope of the curriculum required to be taught under the block. In other words, to cover the material deeper, you must cover fewer topics and sacrifice others. In a study of English teachers utilizing block scheduling, Benton-Kuepper (1999) found this is a very real reality. In her study, teachers reported using more innovative teaching methods and their ability to help the students think more deeply about some of the texts and materials they were using. However, she also found that the teachers reported being able to cover some of the books and materials in the scope of the course while having to cut out some other topics due to time restrictions. The questions this then raise relate to the scope of the curriculum. If the content was important enough to be written into the curriculum standards, then how do you determine what is important to teach on the block and what should be omitted due to time constraints? The thought that the block constrains the time allotted to the teaching of the curriculum rather than allowing it to be taught more fully seems a contradiction in itself. Ultimately, in an assessment of learning, would students who had this course on the block perform as well as those who were able to cover all the content on a more traditional schedule? Given that the scope of content was reduced and that some assumed important content was omitted, it might be presumed that those who covered the entire scope of standards would fare better; however, an assessment was not conducted within Benton-Kuepper's investigation.

In order to delve deeper, and in an attempt to address many of the questions and concerns that arise from this cursory look into different scheduling innovations, an extensive search of available research was conducted. This search for information and research included Education Resource Information Center (ERIC) records, professional refereed journals and archives such as Phi Delta Kappan, National Association of Secondary School Principals (NASSP) Bulletin, Educational Leadership, papers presented at national conferences such as American Educational Research Association (AERA), previous dissertations, and internet resources and search engines. The following paragraphs describe the extent of the field of research uncovered within this search and the findings of this relevant research on the topic of scheduling.

Studies on 4x4 Block Scheduling

Several attempts to gather scientific data and examine the effect of block scheduling on student performance have been attempted. Many of these studies focus on the semester or 4x4 format of block scheduling as compared to year long courses. The courses meeting all year are described as either 8-block format or traditional format. Table 1 provides a summary of the studies related to the 4x4 semester block schedule. The largest study to date on block scheduling occurred in British Columbia, Canada. Investigating science achievement, Bateson (1990) studied the test results of 30,000 tenth graders in high schools in British Columbia who took science either on a 4x4 semester block or who were enrolled in a year long course. In an analysis of variance of the results, he found that students taking science in a year long course significantly outperformed those taking science in the semester format on an end of year test. He also found that the end of year test scores for those who had science in the second semester of a 4x4 semester plan were better than those taking science in the first semester.

In the past, some advocates of block scheduling have argued that the increased depth to which teachers are allowed to teach, given greater amounts of time, also improves student memory and retention. This belief might lead one to the assumption that if teachers are using more effective teaching methodology on the block, given the increased amounts of time that content understanding is deeper and learning would be longer-lasting. Bateson's findings would refute this argument since those on the 4x4 block in the first semester did not perform as well as those in the second semester or those in a year long meeting course. His findings also suggest that test performance for science students on the end of course test measure is improved when the test is given closer in time to taking the course. From Bateson's findings, the conclusion that taking a course over a whole year is better for academic achievement than the 4x4 design might be drawn. For the purposes of this research, however, no data in Bateson's study was investigated for the different types of all year courses, 8-block or traditional, which are both offered on an all year basis.

Table 1
Synthesis of Major Research

Researcher	Population	Schedule	Result(s)	Study Limitations
Bateson (1990)	30,000 tenth graders in British Columbia, Canada	4x4 verses all year courses including 8-block, traditional and modified blocks	Students in all year courses outperformed those in the 4x4 block on a science end-of-course test. Significant results at the .05 level in an *ANOVA* analysis	All yearlong courses grouped into one category without examination of effects between the yearlong schedules. No control for teacher variable or school variable was in place.
Raphael & Wahlstom (1986)	5280 grade 12 and 13 students, 250 classrooms, 80 schools, Ontario, Canada	4x4 block verses traditional all year courses	Students on the 4x4 block scored significantly lower than students on the traditional schedules on the SIMSS math assessment	Traditional yearlong courses included both 8-block and daily meeting classes - did not examine the effects between these groups. No control for teacher variable or school variable was in place.
Raphael & Wahlstom (1986)	Science students, grade 12 and 13 students 75 Ontario schools	4x4 block verses traditional	Students in the traditional schedule performed significantly better on an end of course test than those in the 4x4 block	Traditional yearlong courses included both 8-block and daily meeting classes - did not examine the effects between these groups. No control for teacher variable or school variable was in place.
Lockwood (1995)	Algebra I and geometry students Dothan, Alabama	4x4 verses traditional	Compared test scores using *ANOVA* at the .05 level. Found the results not statistically significant	Compared results from two different school years where transition from one schedule type to another took place. No control for teacher variable was in place. The students were not matched or differences controlled using a covariate.
North Carolina Public Schools (1998)	316 NC High Schools – 221 schools on 4x4 block scheduling, 95 schools on traditional schedules	4x4 block verses traditional schedules	Compared mean t-scores on six end-of-course exams using *ANOVA* and *ANCOVA* tests of significance. No consistent results found. In four of five years biology scores were higher on the block, In most recent three year period, Algebra I and English Lit/Prose were higher on the block. No difference in English I scores, and US history was higher on the traditional schedule.	No information provided on whether changes to the actual tests occurred over time. No controls in place for comparing students with the same instructor. No control in place for consistency of the curriculum in each course by campus.

(table continues)

Table 1 (*continued*).

Researcher	Population	Schedule	Result(s)	Study Limitations
Wild (1998)	High school students in Canada.	4x4 block verses other methods including 8-block, traditional, and intensive quarter scheduling methods	Students on the 4x4 block reported fewer A grades than the other schedule types. Scores on the provincial exams were lower for those on the quarter system and the quarter plan students had the lowest participation rates in the exams.	All of the yearlong schedules were groups together in the data and not reported by schedule type. No descriptive analyses run such as *ANOVA* or *ANCOVA*.
Kramer (1996)	Synthesis of two US studies involving mathematics achievement	4x4 block verses traditional	No significant difference in Algebra I or geometry performance based on schedule	No examination of the differences between yearlong schedule types
Kramer (1997)	Synthesis of five Canadian studies involving student achievement on mathematics and science tests	4x4 block verses traditional	No significant difference between schedule types in some. In others found that students on the 4x4 bock performed below those on the traditional schedules.	No examination of the differences between yearlong schedule types
Marshak (1997)	Staff at one high school in Takoma, Washington	6-block verses traditional	Teachers perceived the block schedule to be better for student learning and for teacher planning and instruction.	No descriptive statistical analyses were used – examined only teacher perception of performance.
Walker (2000)	100,000 tenth graders in Kansas 1994 to 1999 Data from 3456 schools included	4x4 block, 8-block, and traditional schedule types	No significant difference in test performance among students in the block schedules and traditional schedules. All increased in performance, block schools slightly more than traditional, but all increases lagged off several years after implementation of block scheduling.	Data was not broken out by subject area, only used composite state assessment data. Schedule method was not consistent for every campus across the study time line.

(table continues)

Table 1 (*continued*).

Researcher	Population	Schedule	Result(s)	Study Limitations
Veal, Schrieber, and Flinders (2000)	Indiana high school students (pop=1800) with scores on the Indiana state assessments (n=327) and enrolled in grade ten Mostly Anglo including rural and suburban students	4x4 block, traditional, and flexible block schedules running concurrently in the same schools	Compared students' NCE and CSI scores from the ISTEP+ using *ANCOVA* analysis. No significant difference found for reading. Significant differences found for mathematics in computation area where traditional schedule performed higher than the 4x4 block.	A small sample used within the study. No control was in place for the teacher variable. Comparisons were not made between 8-block and traditional using the hybrid design.
Freeman and Marayama (1995)	3637 high school students four schools in Annoka-Hennepin School District, Minnesota	Two schools on 4x4 block and two schools on traditional schedules	No significant difference in mean scores on the district criterion referenced exams. Students' self-report data indicated those on the 4x4 received more A grades than those on the traditional.	Data used from district-developed tests, which are not statistically built. Comparison across campuses vs. within campus might indicate inconsistent curriculum, instruction, or teaching contributing to the results.
Meidl (1997)	Surveyed music teachers in 32 schools and 13 states	4x4 block verses traditional	Participation in music programs decline on the block schedule. Music teachers viewed it difficult for students to reenter a music program after semester off. Music students have difficultly focusing on performance over a 90-minute period. It is harder for music students to also be involved in other school activities while on the block schedule.	No descriptive statistical analyses used. Based only on survey data of teachers
College Board (1998)	Students taking the AP examinations in 1997 Calculus AB, biology, US history, and English literature.	4x4 block, 8-block, and traditional schedules	8-block student performance was highest in Calculus and biology; there was no difference in US history or English literature.	Students taking advanced placement examinations are usually the highest achieving students and significance of the data may be affected by homogeny in the sample.
Nichols (2000a)	6 Indiana urban high schools within a single district and their students	4x4 block, 8-block, and traditional schedules	The percentage of students with two or more failing grades increased for the schools on both 4x4 and 8-block schedules and declined for the traditional schools.	No descriptive statistical analyses used for comparison.

(table continues)

Table 1 (*continued*).

Researcher	Population	Schedule	Result(s)	Study Limitations
Nichols (2000b)	3 Indiana urban high schools within a single district and their students	4x4 block and traditional schedules	The percentage of students with two or more failing grades increased for the schools on both 4x4 and 8-block schedules and declined for the traditional schools. Inconsistent SAT performance between the schools.	No descriptive statistical analyses used for comparison.
Edwards (1995)	Virginia high school students	4x4 block verses traditional schedules	Percentages of A grades (self-reported) rose when block schedules were implemented	No descriptive statistical analyses used for comparison.
Texas Education Agency (1999)	All public high schools in Texas and their students	4x4 block, 8-block, and traditional schedules	No significance in performance measures by schedule type when school context was held constant	Changes in the statewide criterion referenced test makes it difficult to generalize findings to present.
Charles A Dana Center (2000)	Algebra I statewide end-of-course exam test takers in 1999	4x4 block, 8-block, and traditional schedules	No significant difference in test scores based on schedule type	Used only one mathematics course for comparison narrowing the sample.

Two additional Canadian studies also contribute to the research field on block scheduling. Both studies, conducted in Ontario by Raphael and Wahlstom (1986) suggest similar findings to those of Bateson. The first of the two studies investigated mathematics performance among 5280 students in 250 classrooms in 80 schools. The study data was collected in conjunction with the Second International Mathematics and Science Study (SIMSS) using 12th and 13th year students. An analysis of the test results also indicated that students on the 4x4 block faired worse than those students enrolled in a traditional all year course. In fact, this study also examined the actual clock hours of instruction provided to students in both formats of scheduling and determined that the block results in far fewer hours of instruction, and according to the data, is detrimental to student achievement. In the second Ontario study, the researchers sampled science students in grades 12 and 13 from 75 schools. These students were given an end-of-course test in Chemistry, Physics, or biology to match the course most recently completed. Test data and attitude surveys were analyzed for the included science students. The findings of the test data indicated that like the mathematics assessment, the traditional course produced statistically significant improvement compared to the semester block schedule. In contrast, the student survey revealed a preference for the block classes. The same attitude survey was also collected for the mathematics students and the results for the mathematics students favored the traditionally scheduled course.

In an American study of the 4x4 block, Lockwood (1995) investigated the impact of the semester course plan on achievement in Algebra I and geometry students in Dothan, Alabama. Her study consisted of a comparison of test scores for students on the 4x4 semester block to previous year data taken from a traditional six-period day. She investigated the students' performance in Algebra I and geometry courses using a nationally normed test in each course at the end of the spring and fall terms. Using a four-way analysis of variance, the resulting *p*-value was 0.0555, which indicated that there was a 5.5% chance that the difference in the two variables was due to random error alone. Using a 95% confidence interval as is customary; she reported the results of her findings as having no statistical significance.

In an ongoing effort to determine the effects of 4x4 block scheduling on student achievement, The North Carolina public school system has been conducting studies of its own end-of-course test data over a period of several years. Beginning with the period 1990 to 1994, and then repeating the study over the period 1994 to 1998, the state school system compared end-of-course results of students across five core subjects, including Algebra I, biology, English I and II, US history, and English Literature and Prose, for students enrolled in the 4x4 semester and traditional schedules. Three hundred sixteen schools were included in the study with 221 schools reporting a block schedule and 95 reporting a non-block method of scheduling. Looking at the data from the most recent study published in 1999, the results seem inconclusive. The state compared mean *t*-scores on the end-of-course exams utilizing both analysis of variance and analysis of covariance statistical testing. The basic findings for Algebra I indicate that in some years there was a significant different in performance, yet in other years there is no significant difference in performance. For the Algebra I end-of-course tests, of the two years that produced a significant result, both indicated a positive effect of block scheduling on student performance, but survey data from both students and teachers indicated a negative effect on student performance. However, the test years that resulted in statistically significant results occurred three years apart and does not provide information that is particularly conclusive. (See Table 2)

Since no information is provided on the actual end-of-course tests, including any changes that may have occurred in the content or scope of the tests during the study time period, one can only say with any degree of assuredness that the 4x4 block does not seem to be hindering student achievement in Algebra I in North Carolina and that perhaps the use of the 4x4 block is better suited to certain subjects over others.

Specific to the field of science, Wild (1998) sought to investigate achievement, participation in Canadian provincial exams, and the percentage of “A” grades students earned while enrolled in the 4x4 block, intensive quarter schedules, and year long courses (including both 8-block and traditional schedules grouped together). Descriptive statistics were not provided and information about sample size or how the data was gathered was missing from this study. Wild (1998), using participation values and scores gathered on the provincial exams and student self-reports of grades, created tables to make comparison possible. General findings of his investigation indicate that students in the 4x4 system had fewer reported “A” grades than in the other schedules, scores on the provincial exams in science were generally lower for students on the quarter system, and that the quarter plan students also had the lowest participation rates in the provincial exams. The results of his investigation suggest yearlong courses are preferred over the 4x4 or quarter and that it is better to take classes over the longer term than a shorter one. However, no data was gathered to compare the different yearlong schedules and a data analysis was not performed.

Table 2

Statistical Test Results from North Carolina Public Schools Research

	End-of-Course Test Results										Survey Results			
	1994		1995		1996		1997		1998		Teacher		Student	
	Sign	SL	Sign	SL	Sign	SL	Sign	SL	Sign	SL	Sign	SL	Sign	SL
AI			+	.01					+	.01	-	.01	-	.01

AI = Algebra I

Sign = Significance of effect if a statistically significant effect was revealed

SL = Significance level

A synthesis of eight U.S. and Canadian studies on block scheduling, specifically the inclusion of 4x4 formats, conducted by Kramer (1996) revealed similar patterns to those noted in the previous examples. In two of the U.S. studies, Kramer found that there was no statistically significant difference in student achievement in algebra and geometry performance. Of the five Canadian studies synthesized, he found that there was not a statistically significant difference between schedule formats or that students on the 4x4 block performed worse than those on the traditional schedule. In later analysis Kramer (1997) suggests that there is still not enough research on the effects of alternating day schedules (8-block) as compared to traditional schedules on test scores or on failure rates of students. Table 3 provides a summary of the eight studies synthesized in Kramer's (1996) investigation.

Table 3

Summary of Achievement Studies

Study	Location	Limitations	Results
Smythe, Stennett, and Rachar (1974); Stennet and Rachar (1973)	Ontario	Few schools, few students, low reliability of test used, old study, schools not randomly assigned to schedule	Semester block schedule made no difference in grade 10 achievement
Stennett (1985)	Ontario	Few schools, only one city studied, testing done when block-scheduled students had completed less coursework than all-year students, schools not randomly assigned to schedule	Semestered block schedule made no difference in grade 9 achievement
Raphael, Wahlstrom, and McLean (1986)	Ontario	Low ability students may have been filtered out of all-year classrooms,* testing done when some block-scheduled students had completed less coursework than all-year students, some block scheduled students may have forgotten material due to time gap before testing, schools not randomly assigned to schedule	Semestered students enrolled in grade 12 and grade 13 mathematics scores significantly worse on SIMS
Carroll (1994)	Massachusetts	Students were volunteers,* only one school	Quarter-plan block schedule made no difference in mathematics examination scores.
Lockwood (1995)	Alabama	Only two schools, fewer hours allocated per mathematics course under the block schedule, first year of implementation, “history”- natural changes in students enrollment or achievement in different year-may account for results	Despite less time allocated, students in a semestered block schedule scores as well in algebra and geometry as all-year students.
Averett (1994) **	North Carolina	No statistical analysis, fewer hours allocated per mathematics course under the block schedule, first or second year of implementation, “history” may account for results	Despite less time allocated, students in a semestered block schedule achieved as well in geometry and second-year algebra as students in an all-year schedule.
Marshall, Taylor, Bateson, and Bridgen (1995) **	British Columbia	Testing done when some block-scheduled students had completed less coursework than all-year students, some block-scheduled students may have forgotten material due to time gap before testing, schools not randomly assigned to schedule	At the end of grade 10, all-year students achieved significantly better than semestered students, who in turn scores significantly better than quarter-plan students.

*Underlined limitations are particularly important and may mean that the study’s results cannot be attributed to the effects of a block schedule.
**Underlined studies are particularly important. They report apparently valid results from a large number of schools.

(Kramer, *p* 765)

In review of all the related research available on 4x4 block scheduling, two research presentations submitted at the annual meeting of the American Educational Research Association by Veal, Schrieber and Flinders (2000) and Veal and Schrieber (2000) may have the most applicability to this researcher's study. In the studies submitted, Veal and his associates present a unique research case. Like this research study, an opportunity to investigate different scheduling formats running concurrently within the same school was afforded them. Using a high school in Indiana, both papers summarize their study including students enrolled in one of three variations of schedule type. Students were enrolled in a 4x4 program, a traditional program, or a flexible block schedule consisting of three traditional periods meeting daily for 55 minutes each and two block semester classes meeting daily for 87 minutes each. Eighteen hundred students, mostly Anglo from both rural and suburban areas were included in the population. The team used student data for those enrolled in 10th grade taking the Indiana Statewide Testing for Educational Progress (ISTEP+) assessment in all three tested areas of reading, mathematics, and language. The research sample included 327 students from within the population and involved the comparison of Normal Curve Equivalent scores and Cognitive Skills Index scores generated by the assessment. Both scores were norm-referenced measures. analyses of covariance using schedule type, Cognitive Skills Index test scores, and grade point averages were conducted.

The findings generated by the study indicated no significant difference in the sub areas of reading or language; however, significant differences were found in the mathematics sub area of computation. analysis revealed the students' computation achievement in a traditional schedule was significantly higher than that of students in the block schedule. The analyses of covariance results may indicate that traditional schedules are better for mathematics achievement in the area of computation than the 4x4 block, particularly for understanding and retention of computational skills. The major disadvantage to generalizing these results to the current study is the use of only the 4x4 block verses the 8-block or alternating system in the flexible block schedule. Regardless, the results of this study support the conclusion that the 4x4 block schedule is not the best choice for student achievement in mathematics.

Other small-scale studies relating to the comparison of the 4x4 block to traditional formats include Freeman and Marayama (1995) who performed research for the Anoka-Hennepin school district in Minnesota. Their study included four high schools located within the Minnesota school district with two of the schools on a 4x4 block schedule and two following a traditional schedule. The sample included 3,637 students and involved both data generated from district criterion referenced tests and self reported data on grades and perceptions. Of the data generated by the district criterion referenced tests, the raw test scores were converted to percentages and then averaged to produce a percent of scores by schedule. Data was collected for Algebra I, Algebra II and geometry. The criterion referenced test scores were matched using Iowa Test of Basic Skills scores and grades to control for individual differences. Freeman and Marayama found no significant differences in these student performance indicators. Using the self-reported information and survey data of 400 teachers and 8000 students, it appeared that the perception among teachers and students was that on the 4x4 block, low achievers perceived the block schedule more favorably than the traditional schedule and felt that they performed better on the block. Based on student grades, 17% more of students on the 4x4 block reported grades of A or B than those on the traditional schedule.

Studies on Block Schedules beyond the Core Subjects

Looking beyond the core subjects, small examples of qualitative research on block scheduling exist in other subject fields. Most proponents outside of the four core areas for traditional schedules come from the fields of performing arts and athletics. In these subjects daily practice and repetition is thought to improve performance. In a small study conducted in the field of music, Meidl (1997) conducted a survey of music teachers in 32 high schools over 13 states. Using a Likert type survey instrument, he found that after block-scheduling innovations are implemented in schools, there tends to be a decline in enrollment in music programs. This decline is attributed to scheduling dilemmas inherent in the offering choices on the block programs. He also found that 81% of respondents believed that those students who were able to rejoin a music program after a semester off (on the 4x4 system) or after scheduling changes were made, suffered in their performance skills and lagged behind others in proficiency and had difficulty regaining the proficiency they had before sitting out of the class. Seventy-one percent of the music directors felt students had difficulty focusing on the music for the entire 4x4 block period and 84% believed that it is harder for students on the 4x4 block schedule to be involved in multiple music programs concurrently (such as concert band and jazz ensemble). Of the respondents, only 31% felt that they were able to achieve greater depth of skill development and teach more when utilizing the extended time on the 4x4 block schedule.

Studies that Include a Comparison of 8-Block and Traditional Schedules

The College Board (1998) investigated the effects of block scheduling on its own AP examination scores. Using data from the 1997 Advanced Placement examinations in Calculus AB, biology, U.S. history, and English literature, the College Board hoped to weigh in on this debate. Using Preliminary Scholastic Assessment Test (SAT®)/National Merit Scholarship Qualifying Test scores as a covariate to account for beginning differences in student achievement, the College Board ran analyses of covariance statistics and produced scores for students enrolled in either 4x4 block during the fall or spring semesters, those on 8-block schedules, and those on traditional schedules. The majority of students testing that year were either enrolled in 8-block or traditional schedules. The actual mean scores indicated that traditional students score the highest in all four tested areas and 8-block was second in performance on all tests with the exception of English literature. Once the raw data was adjusted using Preliminary Scholastic Assessment Test (SAT®)/National Merit Scholarship Qualifying Test scores as a covariate to control for individual student differences and the analysis run, the College Board found that the 8-block students' achievement was higher than that of traditionally scheduled student in calculus and in biology, but that there was no difference in U.S. history or English literature performance. Regardless of the semester, they interpreted that yearlong course performance was better than the 4x4 semester schedules. The implication for this study is that the 8-block scheduling format has some positive effect on student achievement as compared to traditional year long classes. However, the results of the study are not generalizable to this researcher's study since the data only focused on a narrow scope of the Advanced Placement examinations and are limited to only those examinations. More studies are needed that compare performance of 8-block and traditional student achievement.

Others have attempted to isolate the different schedule format effects on student performance, including a comparison of 8-block and traditional schedules on student achievement. In two studies that are less scientific in nature Nichols (2000a, 2000b) examined six high schools running one of three schedule types for various school success indicators, which included drop out rates, retention rates, attendance, graduation rates, grade point averages, and numbers of students with two or more failing grades. Of the six schools, two were on a 4x4 block, three were on an 8-block schedule, and one remained on the traditional schedule. The raw data was presented in tabular form for comparison. While all of the schools varied greatly across indicators some interesting features of the comparisons were revealed. In all schools on a block schedule, the number of students with two or more failing grades dramatically increased, while the numbers for the same variable at the traditional school decreased over the five-year period studied.

In a study by Edwards (1995) of Virginia students on the 4x4 block, Edwards reported that the percentage of “A” grades earned rose from 21% to 32% once block scheduling was implemented in the studied schools. Nichols’ second study attempted to narrow the focus of his previous investigation to only three of the schools, one traditional and two on the 4x4 block. The raw data was presented in tabular form for comparison and no descriptive statistics presented. Using the same indicators as the first study, as well as the inclusion of Scholastic Assessment Test (SAT®) results, a similar pattern in the data is found. The students scoring two or more failing course grades increased at both blocked schools and decreased in the traditional school. The Scholastic Assessment Test (SAT®) results proved inconsistent after his analysis.

Arnold (2002) introduced a study of Virginia public schools to the body of research that involved a comparison of 11th grade student performance when taking classes on either a seven period traditional schedule or on a seven period block schedule. The block design was similar to the 8-block method where students take classes on an alternating day basis all year long, but in the case for his study, involved only seven periods that alternated days. Arnold (2002) reported a comparison of 11th grade student performance on Riverside Publishing Company's Tests of Achievement and Proficiency based on the schedule type campuses in Virginia reported using. He collected data by survey instrument from the campus administration and public information reports and attempted to analyze student test performance at grade 11 in 1996. He compiled mean differences for the different populations and looked at measures of variation among the scores. During the initial year campuses reported using the block schedule method, increases in student performance were found across all subject areas with an occurrence of 65% of the time. Of the schools that had been using block scheduling for longer periods of time, these increases were not sustained and decreases in student performance became more pronounced. The subject area of mathematics indicated the least number of favorable results during the initial implementation year for campuses. This finding may be significant to the study conducted by this researcher.

When Arnold (2002) compared campuses using block-scheduling designs to those campuses utilizing the tradition type of schedule, he also found during the years

1991 to 1996 no meaningful differences in student academic performance. When he isolated the campuses as to the length of time they had been using the different schedule types, campuses where students had been on a traditional schedule verses the block schedule for three or more years, he noticed that the student performance on the traditionally scheduled campuses was higher than for those on the block method. Since he did not use tests of significance, it is unknown whether the results would have proven statistically significant, but he reported no meaningful difference in mean scores.

The Texas Education Agency has also conducted its own analysis of student performance data. In a report of findings conducted by the Division of Research and Evaluation of the Texas Education Agency (1999) the state evaluated student performance on measures including drop out rates, grade level retention rates, campus Texas Assessment of Academic Skills, precursor to the Texas Assessment of Knowledge and Skills test, rating, participation rates and performance on Scholastic Assessment Test (SAT®), American College Test, and Advanced Placement examinations. A multivariate analysis of the data was conducted. When viewed in isolation, student achievement on performance measures often varied by schedule type, but when school context was held constant and multiple performance measures were examined at the same time, the differences disappeared. “Findings from this study suggest that school context is much more closely related to overall student performance than the particular types of schedules high schools used” (Texas Education Agency, *p*. 1). One comment to note regarding the Texas Education Agency study is that it is difficult to generalize any findings related to Texas Assessment of Academic Skills performance at this time. The Texas Education Agency study took place with data gathered from the school year 1996-1997. Beginning in the school year 1998-1999, the Texas Assessment of Academic Skills test was redesigned to better align to the Texas Essential Knowledge and Skills standards, which were passed into law in 1998. The test was again revised and the Texas Assessment of Knowledge and Skills test implemented in the school year 2001-2002. The Texas Assessment of Academic Skills test did not assess students on skills related to high school content and prior to Texas Assessment of Knowledge and Skills, students were not assessed in as many grade levels, or subject areas in high school such as high school mathematics, science, history, and English beyond English I. A similar study of Texas end-of-course scores for Algebra I was also conducted through the University of Texas at Austin's Charles A. Dana Research Center (2000). Their statistical analysis also revealed no statistically significant differences between scores based on schedule type. At best the Texas Education Agency statement and the Texas data may indicate that block-scheduling formats are not harming students as was thought based upon data from the Canadian and some U.S. studies.

A statewide study comparing variations of flexible block schedules to traditional design was also conducted to include all of the state of Kansas high schools. Walker (2000) as part of his dissertation of the use of block scheduling investigated student achievement for approximately 100,000 tenth graders in Kansas high schools over the four-year period of 1994 through 1999. Using Kansas state assessment data from 345 schools and analyses of variance and analyses of covariance, he looked at the performance of students in high and low socio-economic status schools based on one of three types of schedule. In his findings Walker noted that test scores increased for students in both block and traditional environments and noted some increased gains in the blocked schools, however, he did not find them to be statistically significant. It was noted in his report that for the fourteen schools on block schedules the longest number of years, all showed limited improvement in the first years of implementation, but in comparison to those with more recent implementation of block, began to decrease in the amount of improvement gains made each year and in some cases began to lag behind. These findings may indicate that after the initial Hawthorne effect begins to fade from the first years of implementation, block scheduling may not have sustainability in improvement effects on student achievement. Interesting data that was revealed by Walker's data included the information that for blocked schools, smaller schools performed better in terms of student achievement than large schools and for traditional schools, larger schools performed better than smaller ones. This information may prove helpful for school administrators of various sized campuses in the midst of the decision making process about block scheduling implementation. Walker also made a recommendation in his study that further research into whether block scheduling impacts different subject areas in different ways should be explored. This researcher's study will also attempt to address this question by investigating mathematics courses, including Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement on the two scheduling formats.

A final study to include is that of Woodrow Wilson High School in Takoma, Washington. Presented by Marshak (1997), this action research conducted by the staff members consisted of teachers' free responses as the school moved from a traditional schedule to a three-period alternating block schedule (6-block). Unfortunately this study provides only anecdotal documentation. School staff gathered teachers' free-responses to only one question and analyzed the responses for patterns. The question asked related to teacher's perception of improvement in student learning as a result of the schedule change and to the use of improved teaching practices. No quantitative data was gathered in this study, and while it is important that stakeholders feel they made the right decision in moving to a block format, actual performance data would help in knowing if the decision was a sound one.

Other Anecdotal Studies Related to Block Scheduling

Several nonscientific studies were also found in the review of literature related to block scheduling. While those studies most closely relating to student achievement have been presented in the previous paragraphs, the vast majority of studies relating to the subject matter were not related to student achievement data, but rather to more affective domains. VanMonfrans (1972) studies did involve three core curriculum subjects on all grade levels but utilized teacher made tests and student rating scales on interest and attitude related to scheduling. Davis-Wiley (1995) examined perceptions of administrators and teachers on block schedules through the use of surveys and interviews. Pisapia and Westfall (1997a) investigated the effects related to teaching strategies, teacher and student satisfaction, and student and school performance information that was self-reported in survey format. They found that students in a 4x4 block schedule experienced greater increases in overall grade point average as compared to those on 8-block schedules. They also found that verbal scores rose more for students on the 4x4 schedule than the mathematics scores and that increases in

Scholastic Assessment Test (SAT®) scores were greater for those on 8-block schedules than the 4x4. However, after the first year, student verbal scores rose for both groups. On advanced placement scores it was noted that all of student scores decreased on average for the schools on 4x4 block and also decreased at two of the four schools on he 8-block schedule.

The North Carolina Department of Public Instruction (1994) investigated perceived advantages and disadvantages of scheduling options through the use of interviews, surveys, and focus groups. They found that teachers had more planning time on the block, contact hours with students are reduced by at least 30 hours on the block and that students report having less homework on the block schedule. Some data on end-of-course test score performance was also self-reported in the survey process demonstrating little effect from the schedule type.

Thomas and O'Connell (1997) surveyed 110 parents of 11th and 12th grade students to compare attitudes about scheduling and student performance before and after implementation of block scheduling. They found no correlation between the number of meetings parents attended and support for the block scheduling. However, perceived problems of the block schedule existed for the parents in terms of retention of material, teacher and student absences, time for class discussions, and student-teacher interactions.

Calvery, Sheets, and Bell (1998) conducted surveys of student perception and attitude after converting to a modified block schedule. They surveyed 200 students who had experienced block and traditional scheduling using twelve questions on a Likert type scale. Based on the analysis of the student responses, the students did not significantly favor the block scheduling.

McCoy (1998) gathered data by survey and interview about the academic effects of block scheduling in a small rural school. His analysis found that block scheduling seemed to help students feel more empowered about learning, teachers reported more empowerment in their roles, more homework was completed on the block schedule, that block scheduling seemed to benefit all students fairly equally and that class tardiness decreased.

Chesapeake Public Schools in Virginia evaluated scheduling by survey, interview and advanced placement test data. Officials within the office of program evaluation did raise the concern based on their cursory data review about placing Advanced Placement courses on the 4x4 block system.

Pispia and Westfall (1997b) in a second study did analyze some data relating to grade point averages and Scholastic Assessment Test (SAT®) scores, however, tests of statistical significance were not used. Findings indicated that students had increased grade point averages on the 4x4 block compared to the 8-block system, verbal Scholastic Assessment Test (SAT®) scores were improved on either block type compared to the traditional schedule yet 8-block was higher than 4x4 block, and that in half of the schools with 8-block and in all of the 4x4 block schools Advanced Placement exam performance declined.

Much more research exists documenting the performance of students on 4x4 block programs than on 8-block programs compared to traditional. Of the research that uses tests of statistical significance, the majority of them favor the traditional schedule for mathematics and science. Very few studies exist for other academic areas outside of the core subjects of mathematics, science, history, and language arts investigating student achievement data.

Reflecting on the inconsistent, inconclusive, and ill-sustained results of the research on the use of block scheduling in secondary schools, it is troubling that administrators still look at block scheduling as the answer to the time dilemma in today's schools. The forward of *Thinking Inside the Block Schedule: Strategies for Teaching in Extended Periods of Time* (Robbins, Gregory, & Herndon, 2000), offers the following information:

> Although modifications have been made to some of the types of block schedules…the concept of block scheduling continues to be accepted by many administrators, teachers, parents, and students. There is a growing collection of data from hundreds of individual schools that report increases in student performance based on factors such as improved grade point averages, attendance, and graduation rates, along with increases in the number of students taking AP classes and in ACT test scores. (*p*. ix)

However, given the research base available at this time, these claims are unsubstantiated by scientific evidence. And in seeming contradiction to the above statement, Canady (Canady & Rettig, 1999) writes, "Whether or not block scheduling helps or hinders student achievement on standardized tests remains an open question (*p*.3)." Perhaps the limited data on the subject is best summed by a recent quote from Donald Hackmann (2004):

> Block scheduling has become established practice in high schools, but many educators are unable to explain why it is superior to traditional daily period formats and to what results it is intended to produce. Currently, there is no solid theoretical foundation for block scheduling and there also is limited research documenting its effectiveness in improving student achievement. (*p*. 698)

Ideally, if a high school makes the decision to restructure the academic calendar to a block schedule format, as was suggested not only by the national studies presented previously, but also by other authors and respected education professionals such as Wood (1999) who recommends schools narrow the curriculum and length time blocks for learning, they should base the decision on documented, scientific research and evidence that the schedule type is best suited for the school and students it educates within its walls. Converting to a form of block scheduling for the purpose of better meeting the requirements of the core curriculum (NASSP, 1996), to reduce discipline referrals and improve climate (Canady & Rettig, 1996; Gilkey & Hunt, 1998), or for any other reason than to improve student achievement is not a decision that is focused on the needs of the learner.

Chapter 2 Summary

The currently available body of research on scheduling methods used in schools is limited to a small body of studies, most of which are not scientifically designed and difficult to apply to common practice. Of the body of available research only a few studies seek to compare student performance on the 8-block schedule to student performance on the traditional 50-minute schedule, both year-long schedules. This study hopes to fill the void by offering scientifically based research that compares these two scheduling option. What makes this research unique is the ability to compare students in the same course, with the same teacher, in the same academic year, who are taking classes on the two different schedules. This level of control for the teacher variable and for the student variable will make this research invaluable for decision making regarding the academic benefit of either schedule to students enrolled in high school mathematics courses.

CHAPTER 3

RESEARCH DESIGN

The design of this research study involves a causal-comparative methodology. This method seeks to correlate student achievement in high school mathematics students with the type of schedule in which the student is enrolled and to link these two in such as way as to show a possible cause-effect relationship. In this case, the presumed cause is time due to differences in scheduling types at the high school level and the corresponding effect on student academic performance. This study used a convenience sample that was already in place. Students were randomly assigned a mathematics course in the master schedule, which consisted of two types of time schedules, a 4x4 block schedule and a 50-minute traditional schedule. The researcher did not make the assignments for students or manipulate the variation of the schedule assignments. The academic performance, or effect, of the presumed causal factor, time, was conceptualized and measured using a descriptive analysis and findings were examined based on the level of significance and will be considered in light of other possible causal factors.

In order to determine whether there is a measurable difference in student achievement data among high school students enrolled in any of the four core academic subject areas and taking classes on either an 8-block or traditional schedule, this researcher studied students in two large 4-A high schools located in the McKinney Independent School District, within the Region 10 education service center area of Texas. The two scheduling formats to be investigated were both implemented within these two high schools and ran concurrently. The two schedules had been operating concurrently for one year at the time the data was be gathered. Classes in all subject areas were offered either on a daily 50-minute period or on an 8-block 90-minute period schedule. Thirty-one of 37 teachers in the two schools taught courses on both schedules. The students included for this research study consisted of students enrolled in mathematics, including Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement. These students were enrolled in classes where a teacher instructed the identical course on both schedules so that the teacher instructional variable could be controlled. It was assumed that one teacher provided instruction to both groups of students in an equivalent fashion; thereby, only teachers with identical courses on both schedules were utilized for the purposes of this study. All students involved participated in one or both of the following standardized assessments, as determined by the grade level and course in which they were enrolled during the during the 2004-2005 academic year: Texas Assessment of Knowledge and Skills and Algebra I end-of-course. Students' final course grades were also compared for all courses in the study. Only data for the academic school year of 2004-2005 was collected and compared. As an employee of the McKinney Independent School District as a curriculum specialist, this researcher had full access to student assessment information and other performance measures such as Texas Assessment of Knowledge and Skills test scores, course grades and grade point averages.

Research Methodology

Sampling Procedures

Students enrolled in either McKinney High School or McKinney North High School were used in this study. Students enrolled in alternative high school programs or those who were not enrolled in either high school prior to October 1, 2004 were omitted from this sample. The master teaching schedules (see Appendices B and C) were developed around the district high school bell schedule, which includes three traditional 50-minute classes that meet daily, and four 90-minute block classes that meet on alternate days (see Appendix A). All teachers instructed classes on both the 8-block schedule and on the 50-minute traditional schedule, but not all teachers had the identical course on both time formats. For example, Teacher A may teach Algebra I classes on the daily cycle and Algebra II sections during the blocks. Students were randomly assigned to class meeting times based on their other scheduling needs, graduation requirements, and class availability. Of the whole population of students and teachers on these two campuses, only the courses taught in the academic areas of mathematics were included in the sample. Additionally, the sample was further reduced to include only those classes of students where the teacher instructed the identical course on both time schedules. For example, the students enrolled in Teacher B's Geometry classes, a teacher at McKinney North High School, were included in the study because she taught one daily meeting Geometry class and also taught two Geometry classes during the block times. Her Geometry Pre-Advanced Placement students were, however, omitted from the study because all of these classes were only taught during the block times and there was not a daily meeting class in her schedule that was comparable. The following description illustrates the samples used for data gathering with each student performance indicator, such as the Texas Assessment of Knowledge and Skills, the end-of-course examination in Algebra I, and final course averages.

1. End-of-course test scores – End-of-course test scores were compared for all students enrolled at either high school who attend an Algebra I class and whose teacher instructed said course on both time formats. Analyses of covariance were conducted and were broken down into a total district analysis, a campus analysis, and an individual teacher analysis. The student's score of the prior year Texas Assessment of Knowledge and Skills mathematics portion was used as the covariate to control for individual student performance differences that existed in the sample.
2. Texas Assessment of Knowledge and Skills test scores – Texas Assessment of Knowledge and Skills scores were compared for all students enrolled at either high school in a tested grade level (9-11) for whom a test score was available in mathematics limited to those students whose teacher for mathematics instructed classes on both time formats. Analyses of covariance were conducted and were broken down into a total district analysis, a campus analysis, and an individual teacher analysis. The student's score of the prior year Texas Assessment of Knowledge and Skills mathematics portion was used as the covariate to control for individual student performance differences that existed in the sample.

3. Student grades – Student final course grades were compared for all students enrolled at either high school in mathematics and whose teacher instructed said course on both time formats. Analyses of covariance were conducted and were broken down into a total district analysis, a campus analysis, and an individual teacher analysis. The student's score of the prior year Texas Assessment of Knowledge and Skills mathematics portion was used as the covariate to control for individual student performance differences that existed in the sample.

The sample consists of 1,814 students across 31 teachers in the two high schools in McKinney Independent School District. Table 4 outlines the number of students in each campus for each demographic subgroup and grade level. Since all students enrolled in grade 9 through 11 must take the Texas Assessment of Knowledge and Skills mathematics test, a majority of students in the total McKinney Independent School District high school population was included in the study. Additionally, since course grades in mathematics were also compared, the sample also represented the population. Given that McKinney Independent School District high schools are both 4-A schools in an area of the county that includes a diverse mix of student demographic sub groups, it is hoped that results of this study will also be generalizable to some degree to similar high school populations.

Table 4

Research Sample by Demographic Subgroup and Grade Level By Total District and By High School Campus

	District	McKinney High School	McKinney North High School
Total Sample	1814	955	859
Male	877	462	415
Female	937	493	444
Caucasian	1252	666	586
Hispanic	368	190	178
African-American	140	66	75
Asian/Pacific Islander	43	27	16
American Indian	10	6	4
Grade 9	689	439	250
Grade 10	624	312	312
Grade 11	477	197	280
Grade 12	25	8	17
Economically Disadvantaged	324	168	156
Gifted and Talented	178	119	59
Special Education Inclusion	44	44	0

Data Instruments and Collection Procedures

- Algebra I end-of-course assessment – The Algebra I end-of-course is a Texas statewide developed and administered standardized criterion-referenced test that is optional for school district participation. The contractor for the Texas Education Agency, N.C.S. Pearson, oversees the development of test items, assessment construction, administration, and scoring of the end-of-course test. The test is constructed using advanced psychometrics, including identified *p*-values and Rasch scores by item, and is built each year to achieve a set value of difficulty and performance based on the statistics. Psychometricians working for both the Texas Education Agency and N.C.S. Pearson indicate that the test is both reliable and valid as a measure of student performance on standards of the Texas Essential Knowledge and Skills as a tool to measure student achievement in Algebra I. This test has been stable in composition since the 1998-1999 school year. Students in McKinney Independent School District Algebra I classes were administered the end-of-course test during a three-week window at the end of the academic year in May 2005. The test was administered in the prescribed manner following standardized procedures and was provided to students in an paper format. A released print version from 2001 was used in lieu of online testing for the McKinney students. Results were reported for each student taking the assessment. Results reported include each student's raw score. The passing standard for this assessment is set at 70% of the items. There are 40 items on the assessment. Raw scores and percent of students passing the end-of-course were used for statistical testing of significance and for comparison of student groups.

- Texas Assessment of Knowledge and Skills – The Texas Assessment of Knowledge and Skills tests are Texas statewide developed and administered criterion-referenced standardized tests. The Texas Education Agency, along with their contractor N.C.S. Pearson, oversees the development of test items, assessment construction, administration, scoring, and reporting. The tests are constructed using advanced psychometrics, including identified *p*-values and Rasch scores by item, and are built each year to achieve a set value of difficulty and performance based on the statistics. Psychometricians working for both the Texas Education Agency and N.C.S. Pearson indicate that the tests are both reliable and valid as measures of student performance on standards of the Texas Essential Knowledge and Skills and as tools to measure student achievement. These tests undergo multi-level review and have been stable in composition since the 2002-2003 school year. Students in McKinney Independent School District enrolled in grades 9, 10, and 11 were administered the appropriate and required Texas Assessment of Knowledge and Skills tests during the time period of April 19 – 22, 2005. The tests were administered in the prescribed manner following standardized procedures. Results were reported for each student taking the mathematics assessment. Results reported include each student's scaled score. The passing standard for this assessment is set at various scaled scores based on test construction and panel recommended standards. The passing standards as a percentage and a scaled score were set by a state and national panel established by the Texas Education Agency and were developed under a three-year phase in plan. Table 5 describes the information related to the standards for meeting minimum expectations and commended performance by high school grade level over the phase in period.

Table 5

Texas Assessment of Knowledge and Skills Mathematics Test Standards by Academic Year

		2002-2003		2003-2004		2004-2005		2005-2006	
Level	Standard	Percent	Scaled Score	Percent	Scaled Score	Percent	Scaled Score	Percent	Scaled Score
Grade 9	Passing	48%	2000	54%	2050	60%	2100	60%	2100
	Commended	87%	2400	87%	2400	87%	2400	87%	2400
Grade 10	Passing	45%	2007	52%	2054	59%	2100	59%	2100
	Commended	91%	2400	91%	2400	91%	2400	91%	2400
Grade 11	Passing	42%	2015	42%	2015	48%	2058	55%	2100
	Commended	88%	2400	88%	2400	88%	2400	88%	2400

The required scaled score for meeting standard on the grade 9 and grade 10 assessments was 2100 and the required scaled score for meeting standard on the grade 11 assessment was 2058. These scaled scores correspond to approximately 60% of the items on the grade 9 test, approximately 59% of the items on the items on the grade 10 test, and 48% of the items on the grade 11 test. A commended performance level for all tests for 2005 was set at a scaled score of 2400 or approximately 90% of items correct. Scaled scores and percent of students meeting passing standard and commended standard were used for statistical testing of significance and for comparison of student groups. The data were collected for students in teachers' classes who instructed identical courses on both time formats. The data were collected using Academic Excellence Indicator System (AEIS-it) assessment reporting software and the reports generated wherein.

- Student final course grades – Student course grades are based upon a combination of subjective and objective measures. Generally a student's final grade is a result of a combination of performance on teacher-made assessments, daily teacher-made or textbook assignments, sometimes the inclusion of participation or effort grades, and a cumulative assessment at the end of the semester or academic year. Most final course grades are the average of the two semester grades in an all-year course. While there is no hope in gaining true reliability or validity in grades between teachers, it is assumed that teachers are consistent within their own grading policies and therefore, students' final grades for a single teacher should provide a comparable measure. As grades are reported on a 100-point scale, actual student grades and class average grades were used for comparison of student groups sorted by teacher. These grades were gathered for the 2004-2005 school year from the teacher electronic grade book system within McKinney Independent School District for all mathematics classes included in the study.

Data Analysis Plan

In an effort to describe the plans for organizing and analyzing the data, a database of information was collected using SPSS software. Information about student profiles, test scores, and course grades was gathered according to assigned teacher and schedule type. For reference, the total high school enrollment as of December 2, 2004 in the two McKinney Independent School District high schools was 4,157 students. The study utilized a sample of 1,814 students in the two schools. Analyses of covariance were conducted by subject for the total sample, by subject per campus, and by subject per individual teacher in the study. Analysis of covariance was chosen in order to determine a causal-comparative relationship between student achievement measures and the type of time schedule the course was instructed under. Given that the students have been enrolled in mathematics instruction for many years and variations in prior knowledge and ability exist between students at the beginning of the study, a covariate was needed in order to adjust the data for these individual differences in mathematics knowledge. The following outline of research questions and method should help in describing the specifics related to data acquisition and analysis for the study.

Question 1: Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

a. Is there a statistically significant difference for course grades between students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
b. Is there a statistically significant difference for course grades between students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
c. Is there a statistically significant difference for course grades between students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
d. Is there a statistically significant difference for course grades between students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
e. Is there a statistically significant difference for course grades between students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

f. Is there a statistically significant difference for course grades between students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

g. Is there a statistically significant difference for course grades between students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

h. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

i. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the campus level?

j. Is there a statistically significant difference for course grades between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

k. Is there a statistically significant difference for course grades between gender groups of students taking mathematics courses on a traditional 50-

minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Method: Since the two independent sample means for each teacher and subject will vary in sample size, and effects beyond each teacher within one subject are not useful statistically, analyses of covariance were used to determine relationships for student grades for traditional and 8-block schedules according to each teacher in the sample for each mathematics course, that included the courses Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement. A covariate of prior year Texas Assessment of Knowledge and Skills scale scores was used to match students prior to data analysis and to control for individual student differences. Once all the statistics were calculated, the results were compiled for each course so that the number of significant test results as compared to non-significant results was investigated according to course. The region of significance was set at the 95% level with an expected error set at the 0.05 alpha level. The exact value of the confidence interval varied with each test since the sample size for each teacher's classes varied. One thousand, eighth hundred fourteen grade values were gathered across all the teachers and courses. Average teacher sample is estimated at 59 students per preparation. In addition, the data was analyzed for students in terms of gender and ethnicity to determine if the effect of the schedule type on student course performance varied significantly for these variables.

Question 2: Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th, 10th, or exit level 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

a. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

b. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

c. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

d. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

e. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

f. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

g. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

h. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

i. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

j. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

k. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and

students taking the same course, from the same teacher, on an 8-block schedule?

l. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Method: Since students were randomly assigned to courses on one of two types of schedules, which were also assigned to teachers with some degree of randomness based on the entire school schedule, it is assumed that any variation in the resulting student achievement data will be caused by the independent variable, the type of schedule. Given this assumption, a one-way analysis of covariance using 2003-2004 Texas Assessment of Knowledge and Skills mathematics scaled score as a covariate was used to determine if mean differences existed for the two schedule types (e.g., traditional 50-minute or 8-block) for student performance in mathematics and grade level. Using an alpha set at 0.05 for each test, the results are presented by Texas Assessment of Knowledge and Skills assessment. One thousand eight hundred fourteen student test scores were generated across the tested grade levels in mathematics. In addition, the data was analyzed for the students in terms of gender and ethnicity to determine if the effect of the schedule type on student course performance for these variables varied significantly.

Question 3: Is there a statistically significant difference in state developed end-of-course exam scores between students taking Algebra I on a traditional 50-minute schedule and students taking Algebra I, from the same teacher, on an 8-block schedule?

Method: Assuming randomness of assignment for the two schedule types, (e.g., a 50-minute traditional or 8-block schedule), a one-way analysis of covariance was conducted to determine what effect the independent variable, schedule type, had on student achievement for this assessment. The confidence interval was set for this analysis at the 0.05 alpha level and the covariate of 2003-2004 Texas Assessment of Knowledge and Skills performance used to control for student differences. This data was analyzed and presented according to gender and ethnicity to determine if a statistical difference existed between schedule type.

Question 4: Is there a difference in teacher perception between the 8-block schedule and the traditional schedule?

a. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of student academic success?
b. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of teacher satisfaction?
c. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of teacher retention?
d. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of fulfillment of curricular purpose?

Method: Teachers completed a survey of their perceptions of the two different schedule types. The survey was conducted only of those teachers whose classes were included in the sample. The survey was returned anonymously using a campus contact as facilitator who ensured that surveys were returned, but who protected the anonymity of the teachers. Survey responses to the questions were categorized by type and patterns investigated. These patterns in response and summaries of the categorized responses by question are included for this study.

Summary of Data Analysis

- Analyses of covariance of Texas Assessment of Knowledge and Skills mathematics test scores by teacher and between schedules for mathematics courses, including Algebra I, Geometry, Geometry Pre-Advanced Placement, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, and Pre-Calculus Pre-Advanced Placement.
- Analyses of covariance of Texas Assessment of Knowledge and Skills mathematics test scores for Algebra I, Geometry, Geometry Pre-Advanced Placement, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, and Pre-Calculus Pre-Advanced Placement for the whole district between schedules
- Analyses of covariance of Algebra I end-of-course test scores by teacher between schedules
- Analyses of covariance of Algebra I end-of-course test scores by district between schedules
- Analyses of covariance of student course grade by teacher and between schedules for mathematics courses, including Algebra I, Geometry, Geometry

Pre-Advanced Placement, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, and Pre-Calculus Pre-Advanced Placement.

- Analyses of covariance of student course grade for Algebra I, Geometry, Geometry Pre-Advanced Placement, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, and Pre-Calculus Pre-Advanced Placement for the whole district between schedules

Table 6 outlines each of the major analyses of covariance conducted within the research study. Additional analyses of covariance were also conducted for each teacher for each subgroup of gender and ethnicity for performance on the Texas Assessment of Knowledge and Skills examination, the Algebra I end-of-course examination, and for students' final course grades in each of the teacher's corresponding mathematics courses. These are not summarized in the table as they are too numerous to categorize efficiently in tabular format.

Additional notes:

- Data on all tests reported by whole sample, by gender, by ethnicity
- Descriptive information to be reported based on teacher survey information

Table 6

Summary of Analyses of Covariance Conducted

	TAKS	A1 EOC	A1 Grade	A2 grade	A2 PAP Grade	A3 grade	Geo PAP grade	Geo grade	PC PAP grade
District		x	x	x	x	x	x	x	x
MHS campus		x	x	x	x	x	x	x	x
MNHS campus		x	x	x	x	x	x	x	x
Algebra I	x								
Algebra II	x								
Algebra II PAP	x								
Algebra III	x								
Geometry	x								
Geometry PAP	x								
PC PAP	x								
Teacher 1	x	x	x						
Teacher 2	x	x	x						
Teacher 3	x	x	x						
Teacher 4	x				x				
Teacher 5	x					x			
Teacher 6	x			x					

(*table continues*)

Table 6 (*continued*).

	TAKS	A1 EOC	A1 Grade	A2 grade	A2 PAP Grade	A3 grade	Geo PAP grade	Geo grade	PC PAP grade
Teacher 7	x			x					
Teacher 8	x						x		
Teacher 9	x						x		
Teacher 10	x							x	
Teacher 11	x							x	
Teacher 12	x						x		
Teacher 13	x						x		x
Teacher 14	x				x				
Teacher 15	x								
Teacher 16	x			x					
Teacher 17	x							x	
Teacher 18	x	x	x						
Teacher 19	x	x	x						
Teacher 20	x				x				
Teacher 21	x								x
Teacher 22	x					x			
Teacher 23	x				x				

(*table continues*)

Table 6 (*continued*).

	TAKS	A1 EOC	A1 Grade	A2 grade	A2 PAP Grade	A3 grade	Geo PAP grade	Geo grade	PC PAP grade
Teacher 24	x	x	x						
Teacher 25	x	x	x						
Teacher 26	x								x
Teacher 27	x			x					
Teacher 28	x			x					
Teacher 29	x							x	
Teacher 30	x				x				
Teacher 31	x							x	

A1= Algebra 1, A2 = Algebra 2, Geo = Geometry, A3 = Algebra 3, PC = Pre-Calculus, PAP = Pre-Advanced Placement course

TAKS – Texas Assessment of Knowledge and Skills, EOC = End-of-course exam

MHS – McKinney High School, MNHS = McKinney North High School

An *x* within a cell indicates an analysis test was conducted for the two variables

Data

Data for this study was collected from archival records housed within a computerized data base in the McKinney Independent School District network. The campus master schedules were used to identify mathematics teachers at McKinney High School and McKinney North High School teaching an identical course on both schedule types. Once these teachers were identified, each teacher was assigned a coding number for identification purposes. The campus master schedule, created by the campus administration, was available for the study and teachers who were identified as instructing an identical course on both time schedules were noted. Student rosters were generated from the student information management system, database software used by the district for the scheduling of students into the master schedule, for the identified teacher sections included for the study. Students were each assigned unique identification numbers to protect privacy. Data was then collected at the end of the school year in May 2005, for each student in the study. Demographic information including gender, ethnicity, special education status, gifted and talented identification, and socio-economic status were collected as well as quantitative data for the final course grade in the mathematics course, final exam grade in the mathematics course, prior academic year (2003-2004) Texas Assessment of Knowledge and Skills mathematics test scaled score, and current academic year (2004-2005) Texas Assessment of Knowledge and Skills mathematics test scaled score. Each of these variables was used to create a database for all data related to study participants. This database consisted of 2,236 individual students. Once students for whom all data points could not be collected were eliminated, this database consisted of 1,831 individual students from both McKinney High School and McKinney North High School in McKinney Independent School District.

Student data was then sorted using SPSS software and denoted for each teacher’s course by schedule type. Descriptive statistics for students between schedules for the same course were then run to ensure the two sections were similar for comparison. In a few cases, one schedule type would have a preponderance of students classified as special education. In order to better match schedules for comparison, these students were then eliminated from the study so that the two schedules were matched and statistically similar. This was conducted using percentage graphs to compare populations between time schedules within each teacher. If a teacher’s classes were not well matched between the two schedule types, the special education included students were eliminated from the database. Seventeen special education students were eliminated from all databases in order to match classes for Teacher 5 and Teacher 10. Once the schedule sections were matched according to teacher, the analyses of covariance were conducted and results recorded. Simple spreadsheets were used to record each significance test and whether the results were considered statistically significant. The final database for the research study consisted of 1,814 students. Table 4 previously summarized the demographic information regarding the sample.

As analyses of covariance were conducted within the course of the research study, some tests did generate a statistically significant result that also produced a statistically significant result on a Levene’s test. The Levene’s test was used to determine whether the covariate of student performance on the prior year, 2003-2004, Texas Assessment of Knowledge and Skills test, was properly controlling for the individual difference in student performance that existed from the onset of the study and to ensure that critical assumptions related to analysis of covariance testing were not violated causing invalid results. A statistically significant result at the 0.05 alpha level on a Levene's test would indicate that while a result of statistical significance for the independent variable may have been generated, the differences in the variances between the two groups of students compared, those on the traditional 50-minute schedule and those on an 8-block schedule, may not be equalized by the covariate. The Levene's tests result indicates that the two groups did not have equal variance, an important assumption when conducting an analysis of covariance and in this case indicates that the two groups varied to such a great extent, that the independent variable, schedule type, may not be causing all the differences in the means of the student performance between sections that was not otherwise controlled by the covariate.

Each teacher included in the study was also sent a short survey consisting of three opinion questions regarding the benefits of each schedule type to complete (Appendix D). Teachers returned these surveys anonymously to a campus facilitator who then forwarded the copies to the researcher. Fourteen teacher surveys out of 31 participants were returned indicating a return rate of 45%. These responses were then recorded by question on a master record to aide in summarization of the comments. The sum total of the survey responses is included in Appendix E.

Limitations

1. This study is limited to students enrolled in an Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement or Pre-Calculus Pre-Advanced Placement mathematics course in two, size 4-A suburban high schools within one public school district located within the Region 10 education service center area in the state of Texas. A 4-A high school is classified as such by having an enrollment in grades 9 through 12 of between 900 and 1925 students. Region 10 Education Service Center is 1 of 20 such centers created across the state of Texas to support public schools and districts within a set geographic area. Region 10 serves eight surrounding counties in Texas and approximately 81 public school districts, 31 charter schools, and some private schools located within the counties of Grayson, Fannin, Hunt, Collin, Dallas, Ellis, Rockwall, Kaufman, and a small portion of Van Zandt county.
2. This study is also limited to those teachers having students in an equivalent course running on both time schedules of either traditional 50-minute schedules or 90-minute 8-block schedules in mathematics courses where a Texas Assessment of Knowledge and Skills test or end-of-course is administered.
3. The end-of-course administration is limited only to students enrolled in 9th grade Algebra I.
4. This study does not control for instructional methodologies or differences in instructional delivery between teachers.
5. This study does not control for improvement of staff development, or existing differences in the amount or content of prior professional learning of the teachers.

6. This study does not control for other factors that may attribute to student improvement on test scores. Therefore, results may not be generalizable to other school districts, locations, or states.
7. The data collected includes only mathematics courses and further study of the impact of 8-block scheduling should be conducted in other academic disciplines.
8. This study does not compare other types and variations of scheduling systems and their affects on student achievement.
9. Given the sample size, data from this study may not be generalizable to situations where larger populations of some ethnic groups exist. The sample size in this study is not large enough to generalize the findings according to ethnicity.
10. This study does not seek to analyze the data based on the gender of the classroom teacher, ethnicity of the classroom teacher, years of experience teaching mathematics of the classroom teacher, nor does it consider the number of teaching preparations each classroom teacher in the study had for the academic year in which the data was gathered.

Protection of Human Subjects

The confidentiality of all student and teacher data was maintained at all times. Once obtained all student and teacher names were converted into a coding system. No personal student or teacher information, names, or coding were shared with any other person for any reason. Achievement test results for individual students were not reported within the context of the research results and all identifying student information was removed. The proper forms for the protection of human subjects have been completed and on file with the University Institutional Review Board as required. Proper training in the protection of human subjects was completed on March 1, 2005. Permission was granted for the completion of this study by the Institutional Review Board at the University of North Texas on April 15, 2005.

CHAPTER 4

RESULTS

This study was concerned with the effect of traditional 50-minute period and 8-block scheduling methods on mathematics achievement for high school students attending school in the two high schools in McKinney Independent School District, a suburban city in Texas, during the 2004-2005 academic year. The results of that study are as follows.

Research Question 1 Results

Question 1: Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

a. Is there a statistically significant difference for course grades between students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

b. Is there a statistically significant difference for course grades between students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

c. Is there a statistically significant difference for course grades between students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

d. Is there a statistically significant difference for course grades between students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

e. Is there a statistically significant difference for course grades between students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

f. Is there a statistically significant difference for course grades between students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

g. Is there a statistically significant difference for course grades between students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

h. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

i. Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the campus level?

j. Is there a statistically significant difference for course grades between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

k. Is there a statistically significant difference for course grades between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Analyses of covariance tests of significance were conducted for each of 31 district teachers to determine the effect of traditional 50-minute and 8-block schedules on student course grades. Final course averages for each student were collected and compared for students by teacher and by course. Scaled score data from the 2003-2004 Texas Assessment of Knowledge and Skills mathematics test for each student was used as a covariate to control for individual academic differences. Of the 31 teachers, three of the statistical tests conducted showed statistically significant results at the 0.05 alpha-level. Tables 7 through 77 outline the results of these significance tests. Data for each teacher is presented in a table. A response of “no” in the table would indicate that the null hypothesis was not rejected and that the analysis of covariance did not produce a statistically significant result. A response of “yes” in the table would indicate that an analysis of covariance did produce a statistically significant result for that particular teacher number. Following each table are the statistical results generated by the SPSS software from each analysis of covariance partitioned according to teacher number. Table 7 and the subsequent analyses in Tables 8 through 21 represent results for the Algebra I course. Table 22 and the subsequent analyses in Tables 23 through 33 represent results for the Algebra II course. Table 34 and the subsequent analyses in Tables 35 through 44 represent results for the Algebra II Pre-Advanced Placement course. Table 45 and the subsequent analyses in Tables 46 through 49 represent results for the Algebra III course. Table 50 and the subsequent analyses in Tables 51 through 64 represent results for the Geometry course. Table 65 and the subsequent analyses in Tables 66 through 69 represent results for the Geometry Pre-Advanced Placement course. Table 70 and the subsequent analyses in Tables 71 through 77 represent results for the Pre-Calculus Pre-Advanced Placement course.

Algebra I: Final Grade vs. Schedule Type

Research Question 1.a. asks, “Is there a statistically significant difference for course grades between students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” As shown in Table 7, there were no statistically significant differences between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for seven teachers.

Table 7

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra I Course, by Teacher

Teacher ID	Course	Final Course Grade
1	Algebra I	No
2	Algebra I	No
3	Algebra I	No
18	Algebra I	No
19	Algebra I	No
24	Algebra I	No
25	Algebra I	No

Table 8 shows the results of the analysis of covariance for Teacher 1. The *F*-value was 0.210, which was not statistically significant (p = 0.649).

Table 8

Analysis of Covariance: Algebra I Course Grade - Teacher ID 1 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	111.006(a)	2	55.503	1.058	.355	.040
Intercept	7663.169	1	7663.169	146.048	.000	.741
’04 scaled score	96.191	1	96.191	1.833	.182	.035
Schedule type	11.011	1	11.011	.210	.649	.004
Error	2675.975	51	52.470			
Total	314843.000	54				
Corrected Total	2786.981	53				

a *R* Squared = .040 (Adjusted *R* Squared = .002)

Table 9

Descriptive Statistics - Teacher ID 1- Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	75.28	75.379	7.251	18
2	76.39	76.338	7.248	36

There were 18 students enrolled in the 8-block schedule class and 36 students enrolled in the traditional 50-minute schedule class for Teacher 1. The adjusted mean score for Teacher 1 for the 8-block scheduled class was 75.379 (standard deviation =

7.251) and the adjusted mean score for the traditional 50-minute scheduled class was 76.338 (standard deviation = 7.248). These results are not statistically significant.

Table 10 shows the results of the analysis of covariance for Teacher 2. The *F*-value was 0.361, which was not statistically significant (p = 0.550).

Table 10

Analysis of Covariance: Algebra I Course Grade - Teacher ID 2 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	9816.488(a)	2	4908.244	25.622	.000	.416
Intercept	2362.601	1	2362.601	12.333	.001	.146
‘04 scaled score	9678.982	1	9678.982	50.527	.000	.412
Schedule type	69.084	1	69.084	.361	.550	.005
Error	13792.392	72	191.561			
Total	434753.000	75				
Corrected Total	23608.880	74				

a R Squared = .416 (Adjusted R Squared = .400)

Table 11

Descriptive Statistics - Teacher ID 2 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	75.09	74.781	13.842	47
2	72.29	72.796	13.848	28

There were 47 students enrolled in the 8-block schedule class and 28 students enrolled in the traditional 50-minute schedule class for Teacher 2. The adjusted mean score for Teacher 2 for the 8-block scheduled class was 74.781 (standard deviation = 13.842) and the adjusted mean score for the traditional 50-minute scheduled class was 72.796 (standard deviation = 13.848). These results are not statistically significant.

Table 12 shows the results of the analysis of covariance for Teacher 3. The *F*-value was 0.613, which was not statistically significant (p = 0.438).

Table 12

Analysis of Covariance: Algebra I Course Grade - Teacher ID 3 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1540.749(a)	2	770.375	7.081	.002	.235
Intercept	2013.994	1	2013.994	18.511	.000	.287
‘04 scaled score	1331.224	1	1331.224	12.235	.001	.210
Schedule type	66.693	1	66.693	.613	.438	.013
Error	5004.883	46	108.802			
Total	272065.000	49				
Corrected Total	6545.633	48				

a *R* Squared = .235 (Adjusted *R* Squared = .202)

Table 13

Descriptive Statistics - Teacher ID 3 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	71.82	72.587	10.493	28
2	76.00	74.979	10.517	21

There were 28 students enrolled in the 8-block schedule class and 21 students enrolled in the traditional 50-minute schedule class for Teacher 3. The adjusted mean score for Teacher 3 for the 8-block scheduled class was 72.587 (standard deviation = 10.493) and the adjusted mean score for the traditional 50-minute scheduled class was 74.979 (standard deviation = 10.517). These results are not statistically significant.

Table 14 shows the results of the analysis of covariance for Teacher 18. The *F*-value was 0.604, which was not statistically significant (p = 0.440).

Table 14

Analysis of Covariance: Algebra I Course Grade - Teacher ID 18 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	4143.382(a)	2	2071.691	11.603	.000	.293
Intercept	345.106	1	345.106	1.933	.170	.033
‘04 scaled score	3434.317	1	3434.317	19.234	.000	.256
Schedule type	107.844	1	107.844	.604	.440	.011
Error	9999.024	56	178.554			
Total	308022.000	59				
Corrected Total	14142.407	58				

a *R* Squared = .293 (Adjusted *R* Squared = .268)

Table 15

Descriptive Statistics - Teacher ID 18 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	66.93	69.102	13.615	28
2	73.87	71.907	13.591	31

There were 28 students enrolled in the 8-block schedule class and 31 students enrolled in the traditional 50-minute schedule class for Teacher 18. The adjusted mean score for Teacher 18 for the 8-block scheduled class was 69.102 (standard deviation =

13.615) and the adjusted mean score for the traditional 50-minute scheduled class was 71.907 (standard deviation = 13.591). These results are not statistically significant.

Table 16 shows the results of the analysis of covariance for Teacher 19. The *F*-value was 0.163, which was not statistically significant (p = 0.688).

Table 16

Analysis of Covariance: Algebra I Course Grade - Teacher ID 19 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	3359.590(a)	2	1679.795	14.572	.000	.378
Intercept	10.804	1	10.804	.094	.761	.002
‘04 scaled score	3358.783	1	3358.783	29.137	.000	.378
Schedule type	18.755	1	18.755	.163	.688	.003
Error	5533.155	48	115.274			
Total	277034.000	51				
Corrected Total	8892.745	50				

a *R* Squared = .378 (Adjusted *R* Squared = .352)

Table 17

Descriptive Statistics - Teacher ID 19 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	72.71	73.497	10.750	14
2	72.43	72.136	10.742	37

There were 14 students enrolled in the 8-block schedule class and 37 students enrolled in the traditional 50-minute schedule class for Teacher 19. The adjusted mean score for Teacher 19 for the 8-block scheduled class was 73.497 (standard deviation = 10.750) and the adjusted mean score for the traditional 50-minute scheduled class was 72.136 (standard deviation = 10.742). These results are not statistically significant.

Table 18 shows the results of the analysis of covariance for Teacher 24. The *F*-value was 0.433, which was not statistically significant ($p = 0.513$).

Table 18

Analysis of Covariance: Algebra I Course Grade - Teacher ID 24 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	Df	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	3468.251(a)	2	1734.126	18.223	.000	.324
Intercept	820.493	1	820.493	8.622	.004	.102
‘04 scaled score	3353.281	1	3353.281	35.237	.000	.317
Schedule type	41.187	1	41.187	.433	.513	.006
Error	7232.457	76	95.164			
Total	401168.000	79				
Corrected Total	10700.709	78				

a *R* Squared = .324 (Adjusted *R* Squared = .306)

Table 19

Descriptive Statistics - Teacher ID 24 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	68.63	62.299	9.774	27
2	71.17	70.826	9.764	52

There were 27 students enrolled in the 8-block schedule class and 52 students enrolled in the traditional 50-minute schedule class for Teacher 24. The adjusted mean score for Teacher 24 for the 8-block scheduled class was 62.299 (standard deviation =

9.774) and the adjusted mean score for the traditional 50-minute scheduled class was 70.826 (standard deviation = 9.764). These results are not statistically significant.

Table 20 shows the results of the analysis of covariance for Teacher 25. The *F*-value was 0.355, which was not statistically significant ($p = 0.554$).

Table 20

Analysis of Covariance: Algebra I Course Grade - Teacher ID 25 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	635.289(a)	2	317.645	1.523	.226	.048
Intercept	2831.360	1	2831.360	13.571	.000	.184
‘04 scaled score	603.867	1	603.867	2.894	.094	.046
Schedule type	74.006	1	74.006	.355	.554	.006
Error	12517.568	60	208.626			
Total	309793.000	63				
Corrected Total	13152.857	62				

a *R* Squared = .048 (Adjusted *R* Squared = .017)

Table 21

Descriptive Statistics - Teacher ID 25 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	69.46	69.922	14.512	26
2	68.03	67.703	14.489	37

There were 26 students enrolled in the 8-block schedule class and 37 students enrolled in the traditional 50-minute schedule class for Teacher 25. The adjusted mean score for Teacher 25 for the 8-block scheduled class was 69.922 (standard deviation = 14.512) and the adjusted mean score for the traditional 50-minute scheduled class was 67.703 (standard deviation = 14.489). These results are not statistically significant.

Algebra II: Final Grade vs. Schedule Type

Research Question 1.b. asks, “Is there a statistically significant difference for course grades between students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” As shown in Table 22, there was one out of five analyses that showed a statistically significant difference between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for five teachers.

Table 22

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra II Course, by Teacher

Teacher ID	Course	Final Course Grade
6	Algebra II	No
7	Algebra II	No
16	Algebra II	No
27	Algebra II	Yes*
28	Algebra II	No

Table 23 shows the results of the analysis of covariance for Teacher 6. The *F*-value was 1.800, which was not statistically significant ($p = 0.186$).

Table 23

Analysis of Covariance: Algebra II Course Grade - Teacher ID 6 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	789.545(a)	2	394.773	1.805	.175	.066
Intercept	2441.390	1	2441.390	11.165	.002	.180
’04 scaled score	362.155	1	362.155	1.656	.204	.031
Schedule type	393.564	1	393.564	1.800	.186	.034
Error	11151.656	51	218.660			
Total	248725.380	54				
Corrected Total	11941.201	53				

a *R* Squared = .066 (Adjusted *R* Squared = .029)

Table 24

Descriptive Statistics - Teacher ID 6 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	64.15	64.228	14.790	35
2	70.04	69.886	14.794	19

There were 35 students enrolled in the 8-block schedule class and 19 students enrolled in the traditional 50-minute schedule class for Teacher 6. The adjusted mean score for Teacher 6 for the 8-block scheduled class was 64.228 (standard deviation =

14.790) and the adjusted mean score for the traditional 50-minute scheduled class was 69.886 (standard deviation = 14.794). These results are not statistically significant.

Table 25 shows the results of the analysis of covariance for Teacher 7. The *F*-value was 2.811, which was not statistically significant (p = 0.102).

Table 25

Analysis of Covariance: Algebra II Course Grade - Teacher ID 7 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2302.723(a)	2	1151.362	12.821	.000	.416
Intercept	246.458	1	246.458	2.744	.106	.071
’04 scaled score	1936.569	1	1936.569	21.565	.000	.375
Schedule type	252.419	1	252.419	2.811	.102	.072
Error	3232.866	36	89.802			
Total	224311.000	39				
Corrected Total	5535.590	38				

a *R* Squared = .416 (Adjusted *R* Squared = .384)

Table 26

Descriptive Statistics - Teacher ID 7 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	71.41	71.996	9.491	17
2	77.59	77.140	9.489	22

There were 17 students enrolled in the 8-block schedule class and 22 students enrolled in the traditional 50-minute schedule class for Teacher 7. The adjusted mean score for Teacher 7 for the 8-block scheduled class was 71.996 (standard deviation = 9.491) and the adjusted mean score for the traditional 50-minute scheduled class was 77.140 (standard deviation = 9.489). These results are not statistically significant.

Table 27 shows the results of the analysis of covariance for Teacher 16. The *F*-value was 0.002, which was not statistically significant (p = 0.961).

Table 27

Analysis of Covariance: Algebra II Course Grade - Teacher ID 16 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	991.449(a)	2	495.724	4.543	.017	.189
Intercept	.012	1	.012	.000	.992	.000
’04 scaled score	771.330	1	771.330	7.069	.011	.153
Schedule type	.267	1	.267	.002	.961	.000
Error	4255.337	39	109.111			
Total	280323.000	42				
Corrected Total	5246.786	41				

a *R* Squared = .189 (Adjusted *R* Squared = .147)

Table 28

Descriptive Statistics - Teacher ID 16 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	79.22	80.997	11.005	27
2	84.00	80.806	11.437	15

There were 27 students enrolled in the 8-block schedule class and 15 students enrolled in the traditional 50-minute schedule class for Teacher 16. The adjusted mean score for Teacher 16 for the 8-block scheduled class was 80.997 (standard deviation = 11.005) and the adjusted mean score for the traditional 50-minute scheduled class was 80.806 (standard deviation = 11.437). These results are not statistically significant.

Table 29 shows the results of the analysis of covariance for Teacher 27. The *F*-value was 4.636, which was statistically significant (p = 0.035).

Table 29

Analysis of Covariance: II Course Grade - Teacher ID 27 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	873.017(a)	2	436.508	3.311	.043	.099
Intercept	5024.750	1	5024.750	38.118	.000	.388
’04 scaled score	224.049	1	224.049	1.700	.197	.028
Schedule type	611.118	1	611.118	4.636	.035	.072
Error	7909.205	60	131.820			
Total	410863.000	63				
Corrected Total	8782.222	62				

a *R* Squared = .099 (Adjusted *R* Squared = .069)

Table 30

Descriptive Statistics - Teacher ID 27 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	81.28	81.243	11.481	53
2	72.50	72.710	11.492	10

There were 53 students enrolled in the 8-block schedule class and 10 students enrolled in the traditional 50-minute schedule class for Teacher 27. The adjusted mean score for Teacher 27 for the 8-block scheduled class was 81.243 (standard deviation = 11.481) and the adjusted mean score for the traditional 50-minute scheduled class was 72.710 (standard deviation = 11.492). In this analysis, based on the results of the

Levene’s test, there was no significant difference between the variances of the two groups (p = 0.733). Therefore, there is no evidence of violation of the assumption of homogeneity of variances.

Table 31

Levene's Test of Equality of Error Variances - Teacher 27 - Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
.117	1	61	.733

The statistically non-significant result on the Levene’s test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the 8-block schedule earning a higher mean score than students on the traditional 50-minute schedule.

Table 32 shows the results of the analysis of covariance for Teacher 28. The *F*-value was 0.258, which was not statistically significant (p = 0.613).

Table 32

Analysis of Covariance: Algebra II Course Grade - Teacher ID 28 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1265.620(a)	2	632.810	8.147	.001	.189
Intercept	339.200	1	339.200	4.367	.040	.059
’04 scaled score	1226.203	1	1226.203	15.787	.000	.184
Schedule type	20.051	1	20.051	.258	.613	.004
Error	5437.010	70	77.672			
Total	487277.000	73				
Corrected Total	6702.630	72				

a *R* Squared = .189 (Adjusted *R* Squared = .166)

Table 33

Descriptive Statistics - Teacher ID 28 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	81.97	81.731	8.819	32
2	80.49	80.673	8.817	41

There were 32 students enrolled in the 8-block schedule class and 41 students enrolled in the traditional 50-minute schedule class for Teacher 28. The adjusted mean score for Teacher 28 for the 8-block scheduled class was 81.731 (standard deviation =

8.819) and the adjusted mean score for the traditional 50-minute scheduled class was 80.673 (standard deviation = 8.817). These results are not statistically significant.

Algebra II Pre-Advanced Placement: Grades vs. Schedule Type

Research Question 1.c. asks, “Is there a statistically significant difference for course grades between students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” As shown in Table 9, there was one of five analyses that showed a statistically significant difference between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for five teachers.

Table 34

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra II Pre-Advanced Placement Course, by Teacher

Teacher ID	Course	Final Course Grade
4	Algebra II Pre-Advanced Placement	No
14	Algebra II Pre-Advanced Placement	No
20	Algebra II Pre-Advanced Placement	No
23	Algebra II Pre-Advanced Placement	No
30	Algebra II Pre-Advanced Placement	Yes*

Table 35 shows the results of the analysis of covariance for Teacher 4. The *F*-value was 3.072, which was not statistically significant ($p = 0.085$).

Table 35

Analysis of Covariance: Algebra II Pre-Advanced Placement Course Grade - Teacher ID 4

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1146.192(a)	2	573.096	8.475	.001	.220
Intercept	321.884	1	321.884	4.760	.033	.073
’04 scaled score	1020.635	1	1020.635	15.092	.000	.201
Schedule type	207.715	1	207.715	3.072	.085	.049
Error	4057.554	60	67.626			
Total	433915.000	63				
Corrected Total	5203.746	62				

a *R* Squared = .220 (Adjusted *R* Squared = .194)

Table 36

Descriptive Statistics - Teacher ID 4 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	81.38	81.060	8.237	39
2	84.29	84.819	8.250	24

There were 39 students enrolled in the 8-block schedule class and 24 students enrolled in the traditional 50-minute schedule class for Teacher 4. The adjusted mean score for Teacher 4 for the 8-block scheduled class was 81.060 (standard deviation = 8.237) and the adjusted mean score for the traditional 50-minute scheduled class was 84.819 (standard deviation = 8.250). These results are not statistically significant.

Table 37 shows the results of the analysis of covariance for Teacher 14. The *F*-value was 3.304, which was not statistically significant ($p = 0.075$).

Table 37

Analysis of Covariance: Algebra II Pre-Advanced Placement Course Grade - Teacher ID 14

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1274.985(a)	2	637.492	9.093	.000	.263
Intercept	61.475	1	61.475	.877	.353	.017
’04 scaled score	963.990	1	963.990	13.750	.001	.212
Schedule type	231.627	1	231.627	3.304	.075	.061
Error	3575.648	51	70.111			
Total	342971.540	54				
Corrected Total	4850.633	53				

a *R* Squared = .263 (Adjusted *R* Squared = .234)

Table 38

Descriptive Statistics - Teacher ID 14 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	80.69	80.477	8.377	38
2	75.43	75.929	8.392	16

There were 38 students enrolled in the 8-block schedule class and 16 students enrolled in the traditional 50-minute schedule class for Teacher 14. The adjusted mean score for Teacher 14 for the 8-block scheduled class was 80.477 (standard deviation = 8.377 and the adjusted mean score for the traditional 50-minute scheduled class was 75.929 (standard deviation = 8.392). These results are not statistically significant.

Table 39 shows the results of the analysis of covariance for Teacher 20. The *F*-value was 2.136, which was not statistically significant (p = 0.153).

Table 39

Analysis of Covariance: Algebra II Pre-Advanced Placement Course Grade - Teacher ID 20

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	982.548(a)	2	491.274	6.283	.005	.264
Intercept	20.315	1	20.315	.260	.613	.007
’04 scaled score	904.119	1	904.119	11.563	.002	.248
Schedule type	167.002	1	167.002	2.136	.153	.058
Error	2736.715	35	78.192			
Total	255636.000	38				
Corrected Total	3719.263	37				

a *R* Squared = .264 (Adjusted *R* Squared = .222)

Table 40

Descriptive Statistics - Teacher ID 20 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	83.20	84.042	8.896	15
2	80.26	79.712	8.877	23

There were 15 students enrolled in the 8-block schedule class and 23 students enrolled in the traditional 50-minute schedule class for Teacher 20. The adjusted mean score for Teacher 20 for the 8-block scheduled class was 84.042 (standard deviation =

8.896 and the adjusted mean score for the traditional 50-minute scheduled class was 79.712 (standard deviation = 8.877). These results are not statistically significant.

Table 41 shows the results of the analysis of covariance for Teacher 23. The *F*-value was 0.000, which was not statistically significant (p = 0.995).

Table 41

Analysis of Covariance: Algebra II Pre-Advanced Placement Course Grade - Teacher ID 23

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	351.260(a)	2	175.630	1.818	.191	.168
Intercept	7.003	1	7.003	.072	.791	.004
’04 scaled score	290.927	1	290.927	3.011	.100	.143
Schedule type	.004	1	.004	.000	.995	.000
Error	1739.025	18	96.613			
Total	156376.000	21				
Corrected Total	2090.286	20				

a *R* Squared = .168 (Adjusted *R* Squared = .076)

Table 42

Descriptive Statistics - Teacher ID 23 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	87.88	85.695	10.451	8
2	84.38	85.726	10.218	13

There were 8 students enrolled in the 8-block schedule class and 13 students enrolled in the traditional 50-minute schedule class for Teacher 23. The adjusted mean score for Teacher 23 for the 8-block scheduled class was 85.695 (standard deviation = 10.451 and the adjusted mean score for the traditional 50-minute scheduled class was 85.726 (standard deviation = 10.218). These results are not statistically significant.

Table 43 shows the results of the analysis of covariance for Teacher 30. The *F*-value was 5.073, which was statistically significant ($p = 0.029$).

Table 43

Analysis of Covariance: Algebra II Pre-Advanced Placement Course Grade - Teacher ID 30

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	490.855(a)	2	245.428	3.422	.041	.127
Intercept	772.369	1	772.369	10.771	.002	.186
’04 scaled score	29.336	1	29.336	.409	.526	.009
Schedule type	363.784	1	363.784	5.073	.029	.097
Error	3370.425	47	71.711			
Total	324822.000	50				
Corrected Total	3861.280	49				

a *R* Squared = .127 (Adjusted *R* Squared = .090)

Table 44

Descriptive Statistics - Teacher ID 30 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	77.94	78.102	8.594	33
2	84.35	84.038	8.708	17

There were 33 students enrolled in the 8-block schedule class and 17 students enrolled in the traditional 50-minute schedule class for Teacher 30. The adjusted mean score for Teacher 30 for the 8-block scheduled class was 78.102 (standard deviation = 8.594 and the adjusted mean score for the traditional 50-minute scheduled class was 84.038 (standard deviation = 8.708). In this analysis, based on the results of the Levene’s test, there was no significant difference between the variances of the two groups (p = 0.405). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene’s test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule.

Algebra III: Final Grade vs. Schedule Type

Research Question 1.d. asks, “Is there a statistically significant difference for course grades between students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” As shown in Table 45, there were no statistically significant differences between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for two teachers.

Table 45

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra III Course, by Teacher

Teacher ID	Course	Final Course Grade
5	Algebra III	No
22	Algebra III	No

Table 46 shows the results of the analysis of covariance for Teacher 5. The *F*-value was 1.125, which was not statistically significant ($p = 0.293$).

Table 46

Analysis of Covariance: Algebra III Course Grade - Teacher ID 5 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1089.040(a)	2	544.520	7.381	.001	.212
Intercept	.583	1	.583	.008	.929	.000
’04 scaled score	1065.022	1	1065.022	14.437	.000	.208
Schedule type	83.008	1	83.008	1.125	.293	.020
Error	4057.304	55	73.769			
Total	380518.000	58				
Corrected Total	5146.345	57				

a R Squared = .212 (Adjusted R Squared = .183)

Table 47

Descriptive Statistics - Teacher ID 5 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	80.90	81.290	8.612	39
2	79.53	78.720	8.639	19

There were 39 students enrolled in the 8-block schedule class and 19 students enrolled in the traditional 50-minute schedule class for Teacher 5. The adjusted mean score for Teacher 5 for the 8-block scheduled class was 81.290 (standard deviation = 8.612) and the adjusted mean score for the traditional 50-minute scheduled class was 78.720 (standard deviation = 8.639). These results are not statistically significant.

Table 48 shows the results of the analysis of covariance for Teacher 22. The *F*-value was 0.001, which was not statistically significant (p = 0.978).

Table 48

Analysis of Covariance: Algebra III Course Grade - Teacher ID 22 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	38.091(a)	2	19.045	.140	.870	.009
Intercept	351.807	1	351.807	2.580	.118	.077
’04 scaled score	33.867	1	33.867	.248	.622	.008
Schedule type	.103	1	.103	.001	.978	.000
Error	4226.968	31	136.354			
Total	254012.000	34				
Corrected Total	4265.059	33				

a *R* Squared = .009 (Adjusted *R* Squared = -.055)

Table 49

Descriptive Statistics - Teacher ID 22 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	86.15	85.779	11.988	13
2	85.43	85.661	11.869	21

There were 13 students enrolled in the 8-block schedule class and 21 students enrolled in the traditional 50-minute schedule class for Teacher 22. The adjusted mean score for Teacher 22 for the 8-block scheduled class was 85.779 (standard deviation =

11.988) and the adjusted mean score for the traditional 50-minute scheduled class was 85.661 (standard deviation = 11.869). These results are not statistically significant.

Geometry: Final Grade vs. Schedule Type

Research Question 1.e. asks, "Is there a statistically significant difference for course grades between students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 50, there were no statistically significant differences between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for seven teachers.

Table 50

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Geometry Course, by Teacher

Teacher ID	Course	Final Course Grade
8	Geometry	No
9	Geometry	No
10	Geometry	No
11	Geometry	No
17	Geometry	No
29	Geometry	No
31	Geometry	No

Table 51 shows the results of the analysis of covariance for Teacher 8. The *F*-value was 0.043, which was not statistically significant (p = 0.837).

Table 51

Analysis of Covariance: Geometry Course Grade - Teacher ID 8 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	733.956(a)	2	366.978	4.502	.015	.134
Intercept	4417.626	1	4417.626	54.194	.000	.483
’04 scaled score	677.683	1	677.683	8.314	.006	.125
Schedule type	3.489	1	3.489	.043	.837	.001
Error	4727.847	58	81.515			
Total	374094.000	61				
Corrected Total	5461.803	60				

a *R* Squared = .134 (Adjusted *R* Squared = .105)

Table 52

Descriptive Statistics - Teacher ID 8 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	77.12	77.579	9.089	43
2	79.22	78.116	9.173	18

There were 43 students enrolled in the 8-block schedule class and 18 students enrolled in the traditional 50-minute schedule class for Teacher 8. The adjusted mean score for Teacher 8 for the 8-block scheduled class was 77.579 (standard deviation =

9.089) and the adjusted mean score for the traditional 50-minute scheduled class was 78.116 (standard deviation = 9.173). These results are not statistically significant.

Table 53 shows the results of the analysis of covariance for Teacher 9. The *F*-value was 0.423, which was not statistically significant (p = 0.517).

Table 53

Analysis of Covariance: Geometry Course Grade – Teacher ID 9 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1969.342(a)	2	984.671	9.035	.000	.160
Intercept	6147.769	1	6147.769	56.409	.000	.373
’04 scaled score	1910.164	1	1910.164	17.527	.000	.156
Schedule type	46.088	1	46.088	.423	.517	.004
Error	10353.566	95	108.985			
Total	686947.000	98				
Corrected Total	12322.908	97				

a *R* Squared = .160 (Adjusted *R* Squared = .142)

Table 54

Descriptive Statistics - Teacher ID 9 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	83.52	83.458	10.441	65
2	81.88	82.007	10.444	33

There were 65 students enrolled in the 8-block schedule class and 33 students enrolled in the traditional 50-minute schedule class for Teacher 9. The adjusted mean score for Teacher 9 for the 8-block scheduled class was 83.458 (standard deviation = 10.441) and the adjusted mean score for the traditional 50-minute scheduled class was 82.007 (standard deviation = 10.444). These results are not statistically significant.

Table 55 shows the results of the analysis of covariance for Teacher 10. The *F*-value was 1.720, which was not statistically significant (p = 0.206).

Table 55

Analysis of Covariance: Geometry Course Grade - Teacher ID 10 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	581.441(a)	2	290.720	4.285	.030	.323
Intercept	6582.559	1	6582.559	97.022	.000	.844
’04 scaled score	553.441	1	553.441	8.157	.010	.312
Schedule type	116.672	1	116.672	1.720	.206	.087
Error	1221.226	18	67.846			
Total	141861.000	21				
Corrected Total	1802.667	20				

a R Squared = .323 (Adjusted R Squared = .247)

Table 56

Descriptive Statistics - Teacher ID 10 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	80.33	78.862	8.382	9
2	82.67	83.770	8.345	12

There were 9 students enrolled in the 8-block schedule class and 12 students enrolled in the traditional 50-minute schedule class for Teacher 10. The adjusted mean score for Teacher 10 for the 8-block scheduled class was 78.862 (standard deviation = 8.382) and the adjusted mean score for the traditional 50-minute scheduled class was 83.770 (standard deviation = 8.345). These results are not statistically significant.

Table 57 shows the results of the analysis of covariance for Teacher 11. The *F*-value was 0.761, which was not statistically significant (p = 0.389).

Table 57

Analysis of Covariance: Geometry Course Grade - Teacher ID 11 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1777.533(a)	2	888.767	6.504	.004	.255
Intercept	156.266	1	156.266	1.144	.292	.029
’04 scaled score	1753.957	1	1753.957	12.835	.001	.252
Schedule type	103.936	1	103.936	.761	.389	.020
Error	5192.906	38	136.655			
Total	220668.000	41				
Corrected Total	6970.439	40				

a *R* Squared = .255 (Adjusted *R* Squared = .216)

Table 58

Descriptive Statistics - Teacher ID 11 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	71.29	70.288	11.747	17
2	72.83	73.546	11.728	24

There were 17 students enrolled in the 8-block schedule class and 24 students enrolled in the traditional 50-minute schedule class for Teacher 11. The adjusted mean score for Teacher 11 for the 8-block scheduled class was 70.288 (standard deviation =

11.747) and the adjusted mean score for the traditional 50-minute scheduled class was 73.546 (standard deviation = 11.728). These results are not statistically significant.

Table 59 shows the results of the analysis of covariance for Teacher 17. The *F*-value was 1.941, which was not statistically significant (p = 0.168).

Table 59

Analysis of Covariance: Geometry Course Grade - Teacher ID 17 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2445.221(a)	2	1222.611	8.948	.000	.199
Intercept	1211.253	1	1211.253	8.865	.004	.110
’04 scaled score	2141.556	1	2141.556	15.673	.000	.179
Schedule type	265.217	1	265.217	1.941	.168	.026
Error	9837.925	72	136.638			
Total	448071.000	75				
Corrected Total	12283.147	74				

a *R* Squared = .199 (Adjusted *R* Squared = .177)

Table 60

Descriptive Statistics - Teacher ID 17 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	73.00	73.210	11.690	21
2	77.48	77.400	11.691	54

There were 21 students enrolled in the 8-block schedule class and 54 students enrolled in the traditional 50-minute schedule class for Teacher 17. The adjusted mean score for Teacher 17 for the 8-block scheduled class was 73.210 (standard deviation = 11.690) and the adjusted mean score for the traditional 50-minute scheduled class was 77.400 (standard deviation = 11.691). These results are not statistically significant.

Table 61 shows the results of the analysis of covariance for Teacher 29. The *F*-value was 0.001, which was not statistically significant (*p* = 0.980).

Table 61

Analysis of Covariance: Geometry Course Grade - Teacher ID 29 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	687.719(a)	2	343.859	7.015	.002	.206
Intercept	1992.967	1	1992.967	40.658	.000	.430
’04 scaled score	685.448	1	685.448	13.984	.000	.206
Schedule type	.031	1	.031	.001	.980	.000
Error	2646.948	54	49.018			
Total	356076.000	57				
Corrected Total	3334.667	56				

a *R* Squared = .206 (Adjusted *R* Squared = .177)

Table 62

Descriptive Statistics - Teacher ID 29 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	78.88	78.692	7.006	26
2	78.48	78.645	7.004	31

There were 26 students enrolled in the 8-block schedule class and 31 students enrolled in the traditional 50-minute schedule class for Teacher 29. The adjusted mean score for Teacher 29 for the 8-block scheduled class was 78.692 (standard deviation =

7.006) and the adjusted mean score for the traditional 50-minute scheduled class was 78.645 (standard deviation = 7.004). These results are not statistically significant.

Table 63 shows the results of the analysis of covariance for Teacher 31. The *F*-value was 0.587, which was not statistically significant ($p = 0.447$).

Table 63

Analysis of Covariance: Geometry Course Grade - Teacher ID 31 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	986.018(a)	2	493.009	1.502	.233	.061
Intercept	7274.322	1	7274.322	22.159	.000	.325
’04 scaled score	614.371	1	614.371	1.872	.178	.039
Schedule type	192.841	1	192.841	.587	.447	.013
Error	15100.472	46	328.271			
Total	290962.000	49				
Corrected Total	16086.490	48				

a *R* Squared = .061 (Adjusted *R* Squared = .020)

Table 64

Descriptive Statistics - Teacher ID 31 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	72.31	72.993	18.300	26
2	77.83	77.051	18.320	23

There were 26 students enrolled in the 8-block schedule class and 23 students enrolled in the traditional 50-minute schedule class for Teacher 31. The adjusted mean score for Teacher 31 for the 8-block scheduled class was 72.993 (standard deviation = 18.300) and the adjusted mean score for the traditional 50-minute scheduled class was 77.051 (standard deviation = 18.320). These results are not statistically significant.

Geometry Pre-Advanced Placement: Final Grade vs. Schedule Type

Research Question 1.f. asks, "Is there a statistically significant difference for course grades between students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 65, there were no statistically significant differences between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for two teachers.

Table 65

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Geometry Pre-Advanced Placement Course, by Teacher

Teacher ID	Course	Final Course Grade
12	Geometry Pre-Advanced Placement	No
15	Geometry Pre-Advanced Placement	No

Table 66 shows the results of the analysis of covariance for Teacher 12. The *F*-value was 0.042, which was not statistically significant ($p = 0.838$).

Table 66

Analysis of Covariance: Geometry Pre-Advanced Placement Course Grade - Teacher ID 12

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1692.772(a)	2	846.386	13.488	.000	.153
Intercept	757.970	1	757.970	12.079	.001	.075
’04 scaled score	1664.570	1	1664.570	26.526	.000	.151
Schedule type	2.632	1	2.632	.042	.838	.000
Error	9350.222	149	62.753			
Total	1141953.000	152				
Corrected Total	11042.993	151				

a *R* Squared = .153 (Adjusted *R* Squared = .142)

Table 67

Descriptive Statistics - Teacher ID 12 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	85.95	86.163	7.929	101
2	86.86	86.443	7.941	51

There were 101 students enrolled in the 8-block schedule class and 51 students enrolled in the traditional 50-minute schedule class for Teacher 12. The adjusted mean score for Teacher 12 for the 8-block scheduled class was 86.163 (standard deviation = 7.929) and the adjusted mean score for the traditional 50-minute scheduled class was 86.443 (standard deviation = 7.941). These results are not statistically significant.

Table 68 shows the results of the analysis of covariance for Teacher 15. The *F*-value was 0.029, which was not statistically significant (p = 0.866).

Table 68

Analysis of Covariance: Geometry Pre-Advanced Placement Course Grade - Teacher ID 15

Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1976.807(a)	2	988.404	9.764	.000	.249
Intercept	11547.530	1	11547.530	114.070	.000	.659
’04 scaled score	1948.087	1	1948.087	19.244	.000	.246
Schedule type	2.897	1	2.897	.029	.866	.000
Error	5972.693	59	101.232			
Total	440229.000	62				
Corrected Total	7949.500	61				

a *R* Squared = .249 (Adjusted *R* Squared = .223)

Table 69

Descriptive Statistics - Teacher ID 15 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	84.25	83.259	10.133	28
2	82.88	83.699	10.123	34

There were 28 students enrolled in the 8-block schedule class and 34 students enrolled in the traditional 50-minute schedule class for Teacher 15. The adjusted mean score for Teacher 15 for the 8-block scheduled class was 83.259 (standard deviation = 10.133) and the adjusted mean score for the traditional 50-minute scheduled class was 83.699 (standard deviation = 10.123). These results are not statistically significant.

Pre-Calculus Pre-Advanced Placement: Final Grade vs. Schedule Type

Research Question 1.g. asks, “Is there a statistically significant difference for course grades between students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” As shown in Table 70, there was one of three analyses that showed a statistically significant difference between the course grades students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for three teachers.

Table 70

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Pre-Calculus Course, by Teacher

Teacher ID	Course	Final Course Grade
13	Pre-Calculus	Yes*
21	Pre-Calculus	No
26	Pre-Calculus	No

Table 71 shows the results of the analysis of covariance for Teacher 13. The *F*-value was 10.180, which was statistically significant ($p = 0.002$).

Table 71

Analysis of Covariance: Pre-Calculus Course Grade - Teacher ID 13 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2452.068(a)	2	1226.034	14.533	.000	.354
Intercept	120.857	1	120.857	1.433	.237	.026
’04 scaled score	1021.908	1	1021.908	12.114	.001	.186
Schedule type	858.804	1	858.804	10.180	.002	.161
Error	4471.057	53	84.360			
Total	436899.000	56				
Corrected Total	6923.125	55				

a *R* Squared = .354 (Adjusted *R* Squared = .330)

Table 72

Descriptive Statistics - Teacher ID 13 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	82.57	83.598	9.318	28
2	92.68	91.652	9.318	28

There were 28 students enrolled in the 8-block schedule class and 28 students enrolled in the traditional 50-minute schedule class for Teacher 13. The adjusted mean score for Teacher 13 for the 8-block scheduled class was 83.598 (standard deviation = 9.318) and the adjusted mean score for the traditional 50-minute scheduled class was

91.652 (standard deviation = 9.318). These results are statistically significant on Levene's test of equality of variances, as shown in the Table 73 below. In this analysis the *F*-value was 5.698 and $p = 0.021$.

Table 73

Levene's Test of Equality of Error Variances - Teacher 13 - Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
5.698	1	54	.021

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student grades for this teacher and mathematics class.

Table 74 shows the results of the analysis of covariance for Teacher 21. The *F*-value was 0.001, which was not statistically significant ($p = 0.976$).

Table 74

Analysis of Covariance: Pre-Calculus Course Grade - Teacher ID 21 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	58.185(a)	2	29.093	.423	.658	.024
Intercept	433.683	1	433.683	6.303	.017	.153
’04 scaled score	55.533	1	55.533	.807	.375	.023
Schedule type	.065	1	.065	.001	.976	.000
Error	2408.157	35	68.804			
Total	290959.000	38				
Corrected Total	2466.342	37				

a *R* Squared = .024 (Adjusted *R* Squared = -.032)

Table 75

Descriptive Statistics - Teacher ID 21 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	87.55	87.065	8.484	11
2	86.96	87.159	8.371	27

There were 11 students enrolled in the 8-block schedule class and 27 students enrolled in the traditional 50-minute schedule class for Teacher 21. The adjusted mean score for Teacher 21 for the 8-block scheduled class was 87.065 (standard deviation =

8.484) and the adjusted mean score for the traditional 50-minute scheduled class was 87.159 (standard deviation = 8.371). These results are not statistically significant.

Table 76 shows the results of the analysis of covariance for Teacher 26. The *F*-value was 0.031, which was not statistically significant ($p = 0.861$).

Table 76

Analysis of Covariance: Pre-Calculus Course Grade - Teacher ID 26 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1807.824(a)	2	903.912	10.638	.000	.250
Intercept	407.689	1	407.689	4.798	.032	.070
’04 scaled score	1797.682	1	1797.682	21.158	.000	.248
Schedule type	2.638	1	2.638	.031	.861	.000
Error	5437.847	64	84.966			
Total	472968.000	67				
Corrected Total	7245.672	66				

a *R* Squared = .250 (Adjusted *R* Squared = .226)

Table 77

Descriptive Statistics - Teacher ID 26 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	82.71	83.033	9.223	17
2	83.60	83.489	9.221	50

There were 17 students enrolled in the 8-block schedule class and 50 students enrolled in the traditional 50-minute schedule class for Teacher 26. The adjusted mean score for Teacher 26 for the 8-block scheduled class was 83.033 (standard deviation = 9.223) and the adjusted mean score for the traditional 50-minute scheduled class was 83.489 (standard deviation = 9.221). These results are not statistically significant.

Of the three teachers with statistically significant results, the mathematics courses were all at the advanced level of coursework offered. One of the courses was an Algebra II Pre-Advanced Placement course, one was an Algebra II course, and one was a Pre-Calculus Pre-Advanced Placement course. When the adjusted mean scores for both the traditional 50-minute and 8-block schedules for the Pre-Calculus Pre-Advanced Placement course were compared, the adjusted mean score for the traditional 50-minute class was 91.652 and the 8-block scheduled class was 83.598. In the Algebra II Pre-Advanced Placement course, the adjusted mean score for the traditional 50-minute class was 84.038 and the 8-block scheduled class was 78.102. For the third course, an Algebra II course, the adjusted mean score of the 8-block scheduled class was higher at 81.243 compared to the adjusted mean score of the traditional 50-minute class at 72.710.

District Level Comparisons: Aggregate Analyses for Final Grade vs. Schedule Type

Research Question 1.h. asks “Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?” Results of student performance on final course grades in Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry,

Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement were analyzed for the whole district. Tables 78 though 92 highlight the results of the statistical tests of significance for the district level aggregated performance on final course grades. Of the district level comparisons, the Pre-Calculus course produced a statistically significant result. When the adjusted mean scores for the schedule types were compared, the adjusted mean score for the traditional 50-minute Pre-Calculus Pre-Advanced Placement class was higher at 86.886 than that of the 8-block scheduled class at 83.589.

Table 78 shows the results of the analysis of covariance for Algebra I course grade aggregated at the district level. The *F*-value was 0.015, which was not statistically significant (p = 0.901).

Table 78

Analysis of Covariance Algebra I District level Course Comparison - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	17018.710(a)	2	8509.355	55.729	.000	.207
Intercept	13830.926	1	13830.926	90.582	.000	.175
’04 scaled score	16905.929	1	16905.929	110.720	.000	.206
Schedule type	2.358	1	2.358	.015	.901	.000
Error	65198.787	427	152.690			
Total	2317678.000	430				
Corrected Total	82217.498	429				

a R Squared = .207 (Adjusted R Squared = .203)

Table 79

Descriptive Statistics - Algebra I District Level - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	71.52	71.521	13.848	188
2	72.55	72.554	13.845	242

There were 188 students enrolled in the 8-block schedule Algebra I classes and 242 students enrolled in the traditional 50-minute schedule Algebra I classes across the district. The adjusted mean score for the 8-block scheduled classes was 71.521 (standard deviation = 13.848) and the adjusted mean score for the traditional 50-minute scheduled classes was 72.554 (standard deviation = 13.845). These results are not statistically significant.

Table 80 shows the results of the analysis of covariance for Algebra II course grade aggregated at the district level. The *F*-value was 0.633, which was not statistically significant (p = 0.427).

Table 80

Analysis of Covariance Algebra II District level Course Comparison - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	5254.816(a)	2	2627.408	16.283	.000	.106
Intercept	8550.557	1	8550.557	52.989	.000	.161
’04 scaled score	4979.731	1	4979.731	30.860	.000	.101
Schedule type	102.104	1	102.104	.633	.427	.002
Error	44536.374	276	161.364			
Total	1684482.000	279				
Corrected Total	49791.190	278				

a *R* Squared = .106 (Adjusted *R* Squared = .099)

Table 81

Descriptive Statistics - Algebra II District Level - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	75.76	75.762	13.364	172
2	77.80	77.804	13.375	107

There were 172 students enrolled in the 8-block schedule Algebra II classes and 107 students enrolled in the traditional 50-minute schedule Algebra II classes across the district. The adjusted mean score for the 8-block scheduled classes was 75.762

(standard deviation = 13.364) and the adjusted mean score for the traditional 50-minute scheduled classes was 77.804 (standard deviation = 13.375). These results are not statistically significant.

Table 82 shows the results of the analysis of covariance for Algebra II Pre-Advanced Placement course grade aggregated at the district level. The *F*-value was 0.244, which was not statistically significant (p = 0.622).

Table 82

Analysis of Covariance Algebra II Pre-Advanced Placement District level Course Comparison - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	3793.268(a)	2	1896.634	25.172	.000	.184
Intercept	758.318	1	758.318	10.064	.002	.043
’04 scaled score	3752.876	1	3752.876	49.808	.000	.183
Schedule type	18.366	1	18.366	.244	.622	.001
Error	16802.272	223	75.347			
Total	1514418.000	226				
Corrected Total	20595.540	225				

a *R* Squared = .184 (Adjusted *R* Squared = .177)

Table 83

Descriptive Statistics - Algebra II Pre-Advanced Placement District Level - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	80.95	80.947	9.584	133
2	81.81	81.806	9.576	93

There were 133 students enrolled in the 8-block schedule Algebra II Pre-Advanced Placement classes and 93 students enrolled in the traditional 50-minute schedule Algebra II Pre-Advanced Placement classes across the district. The adjusted mean score for the 8-block scheduled classes was 80.947 (standard deviation = 9.584) and the adjusted mean score for the traditional 50-minute scheduled classes was 81.806 (standard deviation = 9.576). These results are not statistically significant.

Table 84 shows the results of the analysis of covariance for Algebra III course grade aggregated at the district level. The *F*-value was 0.056, which was not statistically significant (p = 0.814).

Table 84

Analysis of Covariance Algebra III District level Course Comparison - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	891.496(a)	2	445.748	4.354	.016	.089
Intercept	163.992	1	163.992	1.602	.209	.018
’04 scaled score	887.631	1	887.631	8.669	.004	.089
Schedule type	5.705	1	5.705	.056	.814	.001
Error	9112.417	89	102.387			
Total	634530.000	92				
Corrected Total	10003.913	91				

a *R* Squared = .089 (Adjusted *R* Squared = .069)

Table 85

Descriptive Statistics - Algebra III District Level - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	82.21	82.212	10.543	52
2	82.63	82.625	10.543	40

There were 52 students enrolled in the 8-block schedule Algebra III classes and 40 students enrolled in the traditional 50-minute schedule Algebra III classes across the district. The adjusted mean score for the 8-block scheduled classes was 80.947 (standard deviation = 9.584) and the adjusted mean score for the traditional 50-minute

scheduled classes was 81.806 (standard deviation = 9.5765). These results are not statistically significant.

Table 86 shows the results of the analysis of covariance for Geometry course grade aggregated at the district level. The *F*-value was 0.014, which was not statistically significant ($p = 0.905$).

Table 86

Analysis of Covariance Geometry District level Course Comparison - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	5576.230(a)	2	2788.115	19.628	.000	.088
Intercept	35479.226	1	35479.226	249.771	.000	.380
’04 scaled score	5565.267	1	5565.267	39.179	.000	.088
Schedule type	2.023	1	2.023	.014	.905	.000
Error	57955.172	408	142.047			
Total	2574362.000	411				
Corrected Total	63531.401	410				

a R Squared = .088 (Adjusted R Squared = .083)

Table 87

Descriptive Statistics - Geometry District Level - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	78.00	78.005	12.463	215
2	78.33	78.332	12.460	196

There were 215 students enrolled in the 8-block schedule Geometry classes and 196 students enrolled in the traditional 50-minute schedule Geometry classes across the district. The adjusted mean score for the 8-block scheduled classes was 78.005 (standard deviation = 12.463) and the adjusted mean score for the traditional 50-minute scheduled classes was 78.332 (standard deviation = 12.460). These results are not statistically significant.

Table 88 shows the results of the analysis of covariance for Geometry Pre-Advanced Placement course grade aggregated at the district level. The *F*-value was 0.082, which was not statistically significant (p = 0.775).

Table 88

Analysis of Covariance Geometry Pre-Advanced Placement District level Course Comparison

Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	3534.465(a)	2	1767.232	23.611	.000	.183
Intercept	12387.472	1	12387.472	165.505	.000	.440
’04 scaled score	3529.515	1	3529.515	47.157	.000	.183
Schedule type	6.140	1	6.140	.082	.775	.000
Error	15792.657	211	74.847			
Total	1582182.000	214				
Corrected Total	19327.121	213				

a *R* Squared = .183 (Adjusted *R* Squared = .175)

Table 89

Descriptive Statistics - Geometry Pre-Advanced Placement District Level - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	85.58	85.581	9.552	129
2	85.27	85.271	9.551	85

There were 129 students enrolled in the 8-block schedule Geometry Pre-Advanced Placement classes and 85 students enrolled in the traditional 50-minute schedule Geometry Pre-Advanced Placement classes across the district. The adjusted mean score for the 8-block scheduled classes was 85.581 (standard deviation = 9.552) and the adjusted mean score for the traditional 50-minute scheduled classes was 85.271 (standard deviation = 9.551). These results are not statistically significant.

Table 90 shows the results of the analysis of covariance for Pre-Calculus Pre-Advanced Placement course grade aggregated at the district level. The *F*-value was 4.545, which was statistically significant (p = 0.035).

Table 90

Analysis of Covariance Pre-Calculus Pre-Advanced Placement District level Course Comparison - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	4002.453(a)	2	2001.227	23.809	.000	.232
Intercept	563.519	1	563.519	6.704	.011	.041
'04 scaled score	3605.592	1	3605.592	42.896	.000	.214
Schedule type	382.017	1	382.017	4.545	.035	.028
Error	13280.590	158	84.054			
Total	1200826.000	161				
Corrected Total	17283.043	160				

a *R* Squared = .232 (Adjusted *R* Squared = .222)

Table 91

Descriptive Statistics - Pre-Calculus Pre-Advanced Placement - District Level Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	83.59	83.589	10.305	56
2	86.89	86.886	10.308	105

There were 56 students enrolled in the 8-block schedule Pre-Calculus Pre-Advanced Placement classes and 105 students enrolled in the traditional 50-minute schedule Pre-Calculus Pre-Advanced Placement classes across the district. The adjusted mean score for the 8-block scheduled classes was 83.589 (standard deviation = 10.305) and the adjusted mean score for the traditional 50-minute scheduled classes was 86.886 (standard deviation = 10.308). These adjusted mean scores are not statistically significant on a Levene's test, although the analysis of covariance did produce statistically significant results, as shown in the Table 92 below. In this analysis the *F*-value was 2.735 and $p = 0.100$.

Table *92*

Levene's Test of Equality of Error Variances

Pre-Calculus Pre-Advanced Placement District

Level - Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
2.735	1	159	.100

The Levene's test measures homogeneity of the variances and based on the results of the Levene's test, there was no significant difference between the variances of the two groups. ($p = 0.100$). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule.

Research Question 1.i asks “Is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the campus level?” Analyses of covariance statistical tests of significance for each campus level’s student performance on final course grade in each mathematics course, including Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement were conducted. Of these tests of significance, two provided statistically significant results: McKinney High School Pre-Calculus pre-Advanced Placement and McKinney High School Algebra II. Tables 93 through 97 highlight the results of these two statistical tests of significance. The adjusted mean scores for the schedule types in each case were compared and in both analyses the adjusted mean score for the traditional 50-minute class was higher than the 8-block class. For the Pre-Calculus Pre-Advanced Placement course, the adjusted mean score of the traditional 50-minute classes was 91.652 compared to an adjusted mean score of 83.598 for the 8-block scheduled classes. For the Algebra II course, the adjusted mean score of the traditional 50-minute classes was 73.735 compared to an adjusted mean score of 66.801 for the 8-block scheduled classes.

Table 93 shows the results of the analysis of covariance for Algebra II course grade aggregated at the campus level for McKinney High School. The *F*-value was 6.006, which was statistically significant (p = 0.016).

Table 93

Analysis of Covariance Algebra II McKinney High School - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2772.178(a)	2	1386.089	7.602	.001	.145
Intercept	1491.923	1	1491.923	8.182	.005	.083
priorscale	1458.795	1	1458.795	8.001	.006	.082
Section	1095.185	1	1095.185	6.006	.016	.063
Error	16410.328	90	182.337			
Total	473036.380	93				
Corrected Total	19182.506	92				

a *R* Squared = .145 (Adjusted *R* Squared = .126)

Table 94

Descriptive Statistics - Algebra II McKinney High School - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	66.52	66.801	13.521	52
2	74.09	73.735	13.694	42

There were 52 students enrolled in the 8-block schedule Algebra II classes and 42 students enrolled in the traditional 50-minute schedule Algebra II classes at McKinney High School. The adjusted mean score for the 8-block scheduled classes was 66.801 (standard deviation = 13.521) and the adjusted mean score for the traditional 50-minute scheduled classes was 73.735 (standard deviation = 13.694).

These results are statistically significant. These adjusted mean scores are not statistically significant on a Levene's test, although the analysis of covariance did produce statistically significant results. In this analysis, based on the results of the Levene's test, there was no significant difference between the variances of the two groups (p = 0.081). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule.

Table 95 shows the results of the analysis of covariance for Pre-Calculus Pre-Advanced Placement course grade aggregated at the campus level for McKinney High School. The F-value was 10.180, which was statistically significant (p = 0.002).

Table 95

Analysis of Covariance Pre-Calculus Pre-Advanced Placement McKinney High School - Final Course Grade - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2452.068(a)	2	1226.034	14.533	.000	.354
Intercept	120.857	1	120.857	1.433	.237	.026
priorscale	1021.908	1	1021.908	12.114	.001	.186
Section	858.804	1	858.804	10.180	.002	.161
Error	4471.057	53	84.360			
Total	436899.000	56				
Corrected Total	6923.125	55				

a R Squared = .354 (Adjusted R Squared = .330)

Table 96.

Descriptive Statistics Pre-Calculus Pre-Advanced Placement - McKinney High School - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	82.57	83.598	9.318	28
2	92.68	91.652	9.318	28

There were 28 students enrolled in the 8-block schedule Pre-Calculus Pre-Advanced Placement classes and 28 students enrolled in the traditional 50-minute schedule Pre-Calculus Pre-Advanced Placement classes at McKinney High School. The adjusted mean score for the 8-block scheduled classes was 83.598 (standard deviation = 9.318) and the adjusted mean score for the traditional 50-minute scheduled classes was 91.652 (standard deviation = 9.318). Although the analysis of covariance did produce statistically significant results, these adjusted mean scores are statistically significant on a Levene's test, as shown in the Table 97 below. In this analysis the *F*-value was 5.698 and p = 0.021.

Table 97

Levene's Test of Equality of Error Variances

Pre-Calculus Pre-Advanced Placement – McKinney High School - Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
5.698	1	54	.021

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student grades for this campus and mathematics class.

Comparisons by Ethnic Subgroup and Gender: Aggregate Analyses

Research Question 1.j. asks, “Is there a statistically significant difference for course grades between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” Research Question 1.k. asks, “Is there a statistically significant difference for course grades between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” Results for final course grades were analyzed by disaggregating the student data by ethnic subgroup and by gender. Analyses of covariance were conducted for each campus and mathematics course, including Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus pre-advanced Placement, for each ethnic group and gender group and the results investigated. Tables 98 through 119 highlight the statistically significant results for final course grade by the subgroups of gender and ethnicity. Of the analyses of covariance conducted based on ethnicity, three of the 93 statistical tests generated a statistically significant result. Of the analyses of covariance conducted based on gender, six of the 62 statistical tests generated a statistically significant result.

Table 98

Significant Results for Final Course Grade by Subgroup Population Produced by Analysis of Covariance

Teacher ID	Course	Subgroup 1	Subgroup 2	Subgroup 3
1	Algebra I	Female (n = 23)		
27	Algebra II	Male* (n = 28)	Hispanic* (n = 14)	
28	Algebra II	Male (n = 30)	Female (n = 43)	Black (n = 8)
15	Geometry Pre-Advanced Placement	Male (n = 28)		
13	Pre-Calculus Pre-Advanced Placement	Female (n = 36)	White* (n = 51)	

Boxes marked with and asterisk (*) indicate a statistically significant result at the 0.05 alpha level, but where a Levene's test also returned a significant result.

Table 99 shows the results of the analysis of covariance for course grade for female students in Algebra I with Teacher 1. The *F*-value was 4.337, which was statistically significant (p = 0.050).

Table 99

Analysis of Covariance Algebra I Female Students – Teacher ID 1 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	367.332(a)	2	183.666	3.285	.058	.247
Intercept	2138.896	1	2138.896	38.252	.000	.657
priorscale	89.157	1	89.157	1.594	.221	.074
Section	242.493	1	242.493	4.337	.050	.178
Error	1118.320	20	55.916			
Total	136317.000	23				
Corrected Total	1485.652	22				

a *R* Squared = .247 (Adjusted *R* Squared = .172)

Table 100

Descriptive Statistics - Algebra I Female Students Teacher ID 1 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	72.60	72.842	7.501	10
2	79.62	79.430	7.496	13

There were 10 female students enrolled in the 8-block schedule Algebra I classes and 13 female students enrolled in the traditional 50-minute schedule Algebra I classes for Teacher 1. The adjusted mean score for the 8-block scheduled classes was 72.842 (standard deviation = 7.501) and the adjusted mean score for the traditional 50-

minute scheduled classes was 79.430 (standard deviation = 7.496). These adjusted mean scores are not statistically significant on a Levene's test although the analysis of covariance did produce statistically significant results. In this analysis, based on the results of the Levene's test, there was no significant difference between the variances of the two groups (p = 0.230). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule.

Table 101 shows the results of the analysis of covariance for course grade for male students in Algebra II with Teacher 27. The F-value was 6.443 which was statistically significant (p = 0.018).

Table 101

Analysis of Covariance Algebra II Male Students – Teacher ID 27 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1080.193(a)	2	540.096	6.064	.007	.327
Intercept	137.294	1	137.294	1.541	.226	.058
priorscale	146.860	1	146.860	1.649	.211	.062
Section	573.884	1	573.884	6.443	.018	.205
Error	2226.664	25	89.067			
Total	184432.000	28				
Corrected Total	3306.857	27				

a *R* Squared = .327 (Adjusted *R* Squared = .273)

Table 102

Descriptive Statistics - Algebra II Male Students Teacher ID 27 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	83.76	83.239	9.619	21
2	70.43	71.997	9.974	7

There were 21 male students enrolled in the 8-block schedule Algebra II classes and 7 male students enrolled in the traditional 50-minute schedule Algebra II classes for Teacher 27. The adjusted mean score for the 8-block scheduled classes was 83.239 (standard deviation = 9.619) and the adjusted mean score for the traditional 50-minute scheduled classes was 71.997 (standard deviation = 9.974). These adjusted mean scores are statistically significant on the analysis of covariance, although they are also statistically significant on a Levene's test of error variances, as shown in the Table 103 below. In this analysis the *F*-value was 7.003 and $p = 0.014$.

Table 103

Levene's Test of Equality of Error Variances

Algebra II Male Students - Teacher ID 27 -

Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
7.003	1	26	.014

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student grades for this teacher and mathematics class. In addition a sample size of seven students in the traditional 50-minute scheduled classes may also violate other assumptions for sample size in an analysis of covariance and should be considered when using these results as the basis of any conclusion.

Table 104 shows the results of the analysis of covariance for course grade for Hispanic students in Algebra II with Teacher 27. The *F*-value was 17.914 which was statistically significant (p = 0.001).

Table 104

Analysis of Covariance Algebra II Hispanic Students – Teacher ID 27 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1707.120(a)	2	853.560	13.934	.001	.717
Intercept	22.204	1	22.204	.362	.559	.032
priorscale	366.494	1	366.494	5.983	.032	.352
Section	1097.342	1	1097.342	17.914	.001	.620
Error	673.809	11	61.255			
Total	89913.000	14				
Corrected Total	2380.929	13				

a *R* Squared = .717 (Adjusted *R* Squared = .666)

Table 105

Descriptive Statistics - Algebra II Hispanic Students Teacher ID 27 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	84.18	83.754	7.847	11
2	60.33	61.903	7.905	3

There were 11 Hispanic students enrolled in the 8-block schedule Algebra II classes and 3 Hispanic students enrolled in the traditional 50-minute schedule Algebra II classes for Teacher 27. The adjusted mean score for the 8-block scheduled classes was 83.754 (standard deviation = 7.8479) and the adjusted mean score for the traditional 50-minute scheduled classes was 61.903 (standard deviation = 7.905). Although the analysis of covariance did produce statistically significant results, the adjusted mean scores are statistically significant on a Levene's test of equality of error variances, as shown in the Table 106low. In this analysis the *F*-value was 10.381 and *p* = 0.007.

Table 106

Levene's Test of Equality of Error Variances

Algebra II Hispanic Students - Teacher ID 27

Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
10.381	1	12	.007

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the 8-block schedule earning a higher mean score than students on the traditional 50-minute schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student grades for this teacher and mathematics class. In addition to the Levene's test data, the small *n* values, particularly on the traditional 50-minute schedule should be noted, as they violate other important assumptions for analysis of covariance, making the validity of the results questionable.

Table 107 shows the results of the analysis of covariance for course grade for male students in Algebra II with Teacher 28. The *F*-value was 6.776 which was statistically significant (p = 0.015).

Table 107

Analysis of Covariance Algebra II Male Students – Teacher ID 28 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1307.272(a)	2	653.636	7.555	.002	.359
Intercept	59.580	1	59.580	.689	.414	.025
priorscale	971.072	1	971.072	11.223	.002	.294
Section	586.235	1	586.235	6.776	.015	.201
Error	2336.095	27	86.522			
Total	188825.000	30				
Corrected Total	3643.367	29				

a *R* Squared = .359 (Adjusted *R* Squared = .311)

Table 108

Descriptive Statistics - Algebra II Male Students Teacher ID 28 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	82.67	84.093	9.419	12
2	75.83	74.882	9.380	18

There were 12 male students enrolled in the 8-block schedule Algebra II classes and 18 male students enrolled in the traditional 50-minute schedule Algebra II classes for Teacher 28. The adjusted mean score for the 8-block scheduled classes was 84.093 (standard deviation = 9.419) and the adjusted mean score for the traditional 50-minute scheduled classes was 74.882 (standard deviation = 9.380). These adjusted mean scores did produce statistically significant results and were not statistically significant on a Levene's test. In is analysis, based on the results of the Levene's test, there was no significant difference between the variances of the two groups ($p = 0.881$). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the 8-block schedule earning a higher mean score than students on the traditional 50-minute schedule.

Table 109 shows the results of the analysis of covariance for course grade for female students in Algebra II with Teacher 28. The F-value was 6.560 which was statistically significant ($p = 0.014$).

Table 109

Analysis of Covariance Algebra II Female Students – Teacher ID 28 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	936.177(a)	2	468.089	10.480	.000	.344
Intercept	16.631	1	16.631	.372	.545	.009
priorscale	864.945	1	864.945	19.365	.000	.326
Section	293.003	1	293.003	6.560	.014	.141
Error	1786.614	40	44.665			
Total	298452.000	43				
Corrected Total	2722.791	42				

a *R* Squared = .344 (Adjusted *R* Squared = .311)

Table 110

Descriptive Statistics - Algebra II Female Students Teacher ID 28 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	81.55	79.987	6.869	20
2	84.13	85.490	6.844	23

There were 20 female students enrolled in the 8-block schedule Algebra II classes and 23 female students enrolled in the traditional 50-minute schedule Algebra II classes for Teacher 28. The adjusted mean score for the 8-block scheduled classes was 79.987 (standard deviation = 6.869) and the adjusted mean score for the traditional 50-minute scheduled classes was 85.490 (standard deviation = 6.844). These adjusted mean scores are not statistically significant on a Levene's test. In this analysis, based on the Levene's test, there was no significant difference between the variances of the two groups ($p = 0.641$). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule.

Table 111 shows the results of the analysis of covariance for course grade for black students in Algebra II with Teacher 28. The *F*-value was 11.792 which was statistically significant ($p = 0.019$).

Table 111

Analysis of Covariance Algebra II Black Students – Teacher ID 28 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	326.658(a)	2	163.329	8.098	.027	.764
Intercept	20.500	1	20.500	1.016	.360	.169
priorscale	233.025	1	233.025	11.554	.019	.698
Section	237.828	1	237.828	11.792	.019	.702
Error	100.842	5	20.168			
Total	48788.000	8				
Corrected Total	427.500	7				

a *R* Squared = .764 (Adjusted *R* Squared = .670)

Table 112

Descriptive Statistics - Algebra II Black Students Teacher ID 28 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	73.33	69.905	4.819	3
2	80.40	82.457	4.691	5

There were 3 Black students enrolled in the 8-block schedule Algebra II classes and 5 Black students enrolled in the traditional 50-minute schedule Algebra II classes for Teacher 28. The adjusted mean score for the 8-block scheduled classes was 69.905 (standard deviation = 4.819) and the adjusted mean score for the traditional 50-minute scheduled classes was 82.457 (standard deviation = 4.691). These adjusted mean scores are not statistically significant on a Levene's test, although the analysis of covariance did produce statistically significant results. In this analysis, based on the results of the Levene's test, there was no significant difference between the variances of the two groups ($p = 0.490$). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule. However, the small *n* value should be noted as they violate another important assumption for analysis of covariance and make the validity of the results questionable.

Table 113 shows the results of the analysis of covariance for course grade for male students in Geometry Pre-Advanced Placement with Teacher 15. The *F*-value was 7.475 which was statistically significant (*p* = 0.011).

Table 113

Analysis of Covariance Geometry Pre-Advanced Placement Male Students – Teacher ID 15 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	985.243(a)	2	492.622	10.910	.000	.466
Intercept	.377	1	.377	.008	.928	.000
priorscale	750.130	1	750.130	16.612	.000	.399
Section	337.539	1	337.539	7.475	.011	.230
Error	1128.864	25	45.155			
Total	193515.000	28				
Corrected Total	2114.107	27				

a *R* Squared = .466 (Adjusted *R* Squared = .423)

Table 114

Descriptive Statistics - Geometry Pre-Advanced Placement Male Students Teacher ID 15 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	86.89	87.757	6.75	9
2	80.68	80.273	6.734	19

There were 9 male students enrolled in the 8-block schedule Geometry Pre-Advanced Placement classes and 19 male students enrolled in the traditional 50-minute schedule Geometry Pre-Advanced Placement classes for Teacher 15. The adjusted mean score for the 8-block scheduled classes was 87.757 (standard deviation = 6.75) and the adjusted mean score for the traditional 50-minute scheduled classes was 80.273 (standard deviation = 6.734). These adjusted mean scores are not statistically significant on a Levene's test, although the analysis of covariance did produce statistically significant results. In this analysis, based on the results of the Levene's test, there was no significant difference between the variances of the two groups (p = 0.158). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the 8-block schedule earning a higher mean score than students on the traditional 50-minute schedule. However, the small n value for the 8-block scheduled classes should be noted as it violates another important assumption of analysis of covariance testing and makes the validity of the results questionable.

Table 115 shows the results of the analysis of covariance for course grade for female students in Pre-Calculus Pre-Advanced Placement with Teacher 13. The F-value was 8.097 which was statistically significant (p = 0.008).

Table 115

Analysis of Covariance Pre-Calculus Pre-Advanced Placement Female Students – Teacher ID 13 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1112.766(a)	2	556.383	7.908	.002	.324
Intercept	.971	1	.971	.014	.907	.000
priorscale	419.321	1	419.321	5.960	.020	.153
Section	569.670	1	569.670	8.097	.008	.197
Error	2321.790	33	70.357			
Total	286104.000	36				
Corrected Total	3434.556	35				

a *R* Squared = .324 (Adjusted *R* Squared = .283)

Table 116

Descriptive Statistics - Pre-Calculus Pre-Advanced Placement Female Students Teacher ID 13 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	84.22	84.608	8.413	18
2	93.00	92.614	8.413	18

There were 18 female students enrolled in the 8-block schedule Pre-Calculus Pre-Advanced Placement classes and 18 female students enrolled in the traditional 50-minute schedule Pre-Calculus Pre-Advanced Placement classes for Teacher 13. The adjusted mean score for the 8-block scheduled classes was 84.608 (standard deviation = 8.413) and the adjusted mean score for the traditional 50-minute scheduled classes was 92.614 (standard deviation = 8.413). These adjusted mean scores are not statistically significant on a Levene’s test, although the analysis of covariance did produce statistically significant results. In this analysis, based on the results of the Levene’s test, there was no significant difference in the variances between the two groups (p = 0.084). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene’s test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule.

Table 117 shows the results of the analysis of covariance for course grade for white students in Pre-Calculus Pre-Advanced Placement with Teacher 13. The F-value was 8.022 which was statistically significant (p = 0.007).

Table 117

Analysis of Covariance Pre-Calculus Pre-Advanced Placement White Students – Teacher ID 13 - Dependent Variable: Final Grade

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2309.313(a)	2	1154.657	13.308	.000	.357
Intercept	58.713	1	58.713	.677	.415	.014
priorscale	749.853	1	749.853	8.643	.005	.153
Section	696.000	1	696.000	8.022	.007	.143
Error	4164.608	48	86.763			
Total	392841.000	51				
Corrected Total	6473.922	50				

a R Squared = .357 (Adjusted R Squared = .330)

Table 118

Descriptive Statistics - Pre-Calculus Pre-Advanced Placement White Students

Teacher ID 13 - Dependent Variable: Final Grade

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	81.40	82.977	9.695	25
2	92.46	90.945	9.678	26

There were 25 white students enrolled in the 8-block schedule Pre-Calculus Pre-Advanced Placement classes and 26 white students enrolled in the traditional 50-minute schedule Pre-Calculus Pre-Advanced Placement classes for Teacher 13. The adjusted mean score for the 8-block scheduled classes was 82.977 (standard deviation = 9.695) and the adjusted mean score for the traditional 50-minute scheduled classes was 90.945 (standard deviation = 9.678). Although the analysis of covariance did produce statistically significant results, the adjusted mean scores are statistically significant on a Levene’s test of equality of error variances, as shown in the Table 119 below. In this analysis the *F*-value was 7.503 and *p* = 0.009.

Table 119

Levene's Test of Equality of Error Variances

Pre-Calculus Pre-Advanced Placement White Students -

Teacher ID 13 - Dependent Variable: Final Grade

F	*df1*	*df2*	Sig.
7.503	1	49	.009

The Levene’s test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student grades for this teacher and mathematics class.

Research Question 2 Results

Question 2: Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th, 10th, or exit level 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

a. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?
b. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade

students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

c. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

d. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

e. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

f. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking

Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

g. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit level 11th grade students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

h. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

i. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

j. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas

Assessment of Knowledge and Skills) between 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

k. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

l. Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Analyses of covariance tests of significance were conducted for each of 31 teachers to determine the effect of a traditional 50-minute and an 8-block schedule on student mathematics performance on the Texas Assessment of Knowledge and Skills test. Scaled scores for the 2004-2005 academic year Texas Assessment of Knowledge and Skills mathematics administration for each student were collected and compared for students by teacher and by course. Scaled score data from the 2003-2004 Texas Assessment of Knowledge and Skills mathematics portion for each student was used as a covariate to control for individual academic differences. Of the 31 teachers, none of the analyses of covariance resulted in statistically significant results at the 0.05 alpha level.

Tables 120 through 188 outline the results of these significance tests. Each subject is presented with a table describing whether the null hypothesis, that there is no statistically significant difference in students' Texas Assessment of Knowledge and Skills scaled score based on the schedule type, should be rejected. A response of "no" in the table would indicate that the null hypothesis was not rejected and that the analysis of covariance did not produce a statistically significant result. A response of "yes" in the table would indicate that an analysis of covariance did produce a statistically significant result for that particular teacher number. Following each table are the tables generated by the SPSS software from each analysis of covariance by teacher number. Table 120 and the subsequent analyses in Tables 121 through 134 represent results for the Algebra I course and teachers. Table 135 and the subsequent analyses in Tables 136 through 145 represent results for the Algebra II course and teachers. Table 146 and the subsequent analyses in Tables 147 through 156 represent results for the Algebra II Pre-Advanced Placement course and teachers. Table 157 and the subsequent analyses in Tables 158 through 161 represent results for the Algebra III course and teachers. Table 162 and the subsequent analyses in Tables 163 through 176 represent results for the Geometry course and teachers. Table 177 and the subsequent analyses in Tables 178 through 181 represent results for the Geometry Pre-Advanced Placement course and teachers. Table 182 and the subsequent analyses in Tables 183 through 188 represent results for the Pre-Calculus Pre-Advanced Placement course and teachers.

Ninth Graders' Mathematics TAKS Test Scores vs. Schedule Type (Algebra I Students)

Research Question 2.a. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 120, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for seven teachers.

Table 120

Decision about Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra I Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
1	No
2	No
3	No
18	No
19	No
24	No
25	No

Table 121 shows the results of the analysis of covariance for Teacher 1. The *F*-value was 0.293, which was not statistically significant ($p = 0.591$).

Table 121

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by course for Algebra I - Teacher ID 1 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1790750.008(a)	2	895375.004	17.978	.000	.414
Intercept	1390485.142	1	1390485.142	27.920	.000	.354
’04 scaled score	1788332.221	1	1788332.221	35.908	.000	.413
Schedule type	14573.196	1	14573.196	.293	.591	.006
Error	2539942.584	51	49802.796			
Total	208271866.000	54				
Corrected Total	4330692.593	53				

a *R* Squared = .414 (Adjusted *R* Squared = .391)

Table 122

Descriptive Statistics - Teacher ID 1 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	1952.83	1966.636	223.379	18
2	1938.64	1931.737	223.272	36

There were 18 students enrolled in the 8-block schedule classes and 36 students enrolled in the traditional 50-minute schedule classes for Teacher 1. The adjusted mean score for Teacher 1 for the 8-block scheduled classes was 1966.636 (standard deviation = 223.379) and the adjusted mean score for the traditional 50-minute

scheduled classes was 1931.737 (standard deviation = 223.272). These results are not statistically significant.

Table 123 shows the results of the analysis of covariance for Teacher 2. The *F*-value was 0.302, which was not statistically significant (p = 0.584).

Table 123.

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra I - Teacher ID 2 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2800183.752(a)	2	1400091.876	24.571	.000	.406
Intercept	5664928.851	1	5664928.851	99.418	.000	.580
’04 scaled score	2764493.175	1	2764493.175	48.516	.000	.403
Schedule type	17217.854	1	17217.854	.302	.584	.004
Error	4102614.168	72	56980.752			
Total	321205320.000	75				
Corrected Total	6902797.920	74				

a *R* Squared = .406 (Adjusted *R* Squared = .389)

Table 124

Descriptive Statistics - Teacher ID 2 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2063.96	2058.822	238.762	47
2	2018.86	2027.478	238.795	28

There were 47 students enrolled in the 8-block schedule classes and 28 students enrolled in the traditional 50-minute schedule classes for Teacher 2. The adjusted mean score for Teacher 2 for the 8-block scheduled classes was 2058.822 (standard deviation = 238.762) and the adjusted mean score for the traditional 50-minute scheduled classes was 2027.478 (standard deviation = 238.795). These results are not statistically significant.

Table 125 shows the results of the analysis of covariance for Teacher 3. The *F*-value was 0.160, which was not statistically significant (p = 0.691).

Table 125

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra I - Teacher ID 3 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2501159.884(a)	2	1250579.942	49.173	.000	.681
Intercept	511020.205	1	511020.205	20.093	.000	.304
’04 scaled score	2460592.782	1	2460592.782	96.750	.000	.678
Schedule type	4079.348	1	4079.348	.160	.691	.003
Error	1169893.789	46	25432.474			
Total	212399246.000	49				
Corrected Total	3671053.673	48				

a *R* Squared = .681 (Adjusted *R* Squared = .667)

Table 126

Descriptive Statistics - Teacher ID 3 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2039.00	2071.933	160.454	28
2	2097.14	2053.232	160.784	21

There were 28 students enrolled in the 8-block schedule classes and 21 students enrolled in the traditional 50-minute schedule classes for Teacher 3. The adjusted mean score for Teacher 3 for the 8-block scheduled classes was 2071.933 (standard deviation = 160.454) and the adjusted mean score for the traditional 50-minute scheduled classes was 2053.232 (standard deviation = 160.784). These results are not statistically significant.

Table 127 shows the results of the analysis of covariance for Teacher 18. The *F*-value was 2.899, which was not statistically significant ($p = 0.094$).

Table 127

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra I - Teacher ID 18 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2902293.969(a)	2	1451146.984	44.773	.000	.615
Intercept	397068.215	1	397068.215	12.251	.001	.179
’04 scaled score	2882093.178	1	2882093.178	88.923	.000	.614
Schedule type	93974.484	1	93974.484	2.899	.094	.049
Error	1815031.421	56	32411.275			
Total	271113701.000	59				
Corrected Total	4717325.390	58				

a *R* Squared = .615 (Adjusted *R* Squared = .602)

Table 128

Descriptive Statistics - Teacher ID 18 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2105.43	2168.404	183.467	28
2	2142.48	2085.603	183.135	31

There were 28 students enrolled in the 8-block schedule classes and 31 students enrolled in the traditional 50-minute schedule classes for Teacher 18. The adjusted mean score for Teacher 18 for the 8-block scheduled classes was 2168.404 (standard deviation = 183.467) and the adjusted mean score for the traditional 50-minute scheduled classes was 2085.603 (standard deviation = 183.135). These results are not statistically significant.

Table 129 shows the results of the analysis of covariance for Teacher 19. The *F*-value was 0.937, which was not statistically significant ($p = 0.338$).

Table 129

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra I - Teacher ID 19 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	516690.146(a)	2	258345.073	8.076	.001	.252
Intercept	1197840.310	1	1197840.310	37.447	.000	.438
’04 scaled score	499408.418	1	499408.418	15.613	.000	.245
Schedule type	29964.720	1	29964.720	.937	.338	.019
Error	1535396.364	48	31987.424			
Total	234615511.000	51				
Corrected Total	2052086.510	50				

a *R* Squared = .252 (Adjusted *R* Squared = .221)

Table 130

Descriptive Statistics - Teacher ID 19 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2165.36	2174.906	179.079	14
2	2124.11	2120.495	178.937	37

There were 14 students enrolled in the 8-block schedule classes and 37 students enrolled in the traditional 50-minute schedule classes for Teacher 19. The adjusted mean score for Teacher 19 for the 8-block scheduled classes was 2174.906 (standard deviation = 179.079) and the adjusted mean score for the traditional 50-minute scheduled classes was 2120.495 (standard deviation = 178.937). These results are not statistically significant.

Table 131 shows the results of the analysis of covariance for Teacher 24. The *F*-value was 2.359, which was not statistically significant ($p = 0.129$).

Table 131

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra I - Teacher ID 24 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	5122243.365(a)	2	2561121.682	21.481	.000	.361
Intercept	152113.690	1	152113.690	1.276	.262	.017
’04 scaled score	4644343.208	1	4644343.208	38.953	.000	.339
Schedule type	281219.651	1	281219.651	2.359	.129	.030
Error	9061396.382	76	119228.900			
Total	355146056.000	79				
Corrected Total	14183639.747	78				

a *R* Squared = .361 (Adjusted *R* Squared = .344)

Table 132

Descriptive Statistics - Teacher ID 24 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	1969.56	1994.467	345.918	27
2	2133.54	2120.604	345.621	52

There were 27 students enrolled in the 8-block schedule classes and 52 students enrolled in the traditional 50-minute schedule classes for Teacher 24. The adjusted mean score for Teacher 24 for the 8-block scheduled classes was 1994.467 (standard deviation = 345.918) and the adjusted mean score for the traditional 50-minute scheduled classes was 2120.604 (standard deviation = 345.621). These results are not statistically significant.

Table 133 shows the results of the analysis of covariance for Teacher 25. The *F*-value was 2.236, which was not statistically significant (p = 0.140).

Table 133

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra I - Teacher ID 25 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	976348.813(a)	2	488174.407	7.512	.001	.200
Intercept	2181036.985	1	2181036.985	33.563	.000	.359
’04 scaled score	735258.973	1	735258.973	11.315	.001	.159
Schedule type	145278.217	1	145278.217	2.236	.140	.036
Error	3898974.171	60	64982.903			
Total	275573883.000	63				
Corrected Total	4875322.984	62				

a *R* Squared = .200 (Adjusted *R* Squared = .174)

Table 134

Descriptive Statistics - Teacher ID 25 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	1999.08	2015.144	256.078	26
2	2124.73	2113.439	255.732	37

There were 26 students enrolled in the 8-block schedule classes and 37 students enrolled in the traditional 50-minute schedule classes for Teacher 25. The adjusted mean score for Teacher 25 for the 8-block scheduled classes was 2015.144 (standard deviation = 256.078) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2113.439 (standard deviation = 255.732). These results are not statistically significant.

Eleventh Graders' Mathematics TAKS test scores vs. Schedule Type (Algebra II Students)

Research Question 2.b. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 135, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for five teachers.

Table 135

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra II Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
6	No
7	No
16	No
27	No
28	No

Table 136 shows the results of the analysis of covariance for Teacher 6. The *F*-value was 1.179, which was not statistically significant (p = 0.283).

Table 136

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II - Teacher ID 6 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	713911.587(a)	2	356955.794	2.598	.084	.092
Intercept	2062073.820	1	2062073.820	15.006	.000	.227
’04 scaled score	525577.178	1	525577.178	3.825	.056	.070
Schedule type	161999.343	1	161999.343	1.179	.283	.023
Error	7008462.783	51	137420.839			
Total	245576860.000	54				
Corrected Total	7722374.370	53				

a *R* Squared = .092 (Adjusted *R* Squared = .057)

Table 137

Descriptive Statistics - Teacher ID 6 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2055.23	2058.348	370.826	35
2	2178.89	2173.148	370.148	19

There were 35 students enrolled in the 8-block schedule classes and 19 students enrolled in the traditional 50-minute schedule classes for Teacher 6. The adjusted mean score for Teacher 6 for the 8-block scheduled classes was 2058.348 (standard deviation = 370.826) and the adjusted mean score for the traditional 50-minute scheduled classes was 2173.148 (standard deviation = 370.148). These results are not statistically significant.

Table 138 shows the results of the analysis of covariance for Teacher 7. The *F*-value was 2.658, which was not statistically significant (p = 0.112).

Table 138

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II - Teacher ID 7 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	296503.854(a)	2	148251.927	11.707	.000	.394
Intercept	102342.144	1	102342.144	8.082	.007	.183
’04 scaled score	248001.619	1	248001.619	19.584	.000	.352
Schedule type	33662.315	1	33662.315	2.658	.112	.069
Error	455882.146	36	12663.393			
Total	182879305.000	39				
Corrected Total	752386.000	38				

a *R* Squared = .394 (Adjusted *R* Squared = .360)

Table 139

Descriptive Statistics - Teacher ID 7 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2120.88	2127.490	112.701	17
2	2192.00	2186.894	112.664	22

There were 17 students enrolled in the 8-block schedule classes and 22 students enrolled in the traditional 50-minute schedule classes for Teacher 7. The adjusted mean score for Teacher 7 for the 8-block scheduled classes was 2127.490 (standard deviation = 112.701) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2186.894 (standard deviation = 112.664). These results are not statistically significant.

Table 140 shows the results of the analysis of covariance for Teacher 16. The *F*-value was 0.294, which was not statistically significant (p = 0.591).

Table 140

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II - Teacher ID 16 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	527410.464(a)	2	263705.232	10.769	.000	.356
Intercept	28971.554	1	28971.554	1.183	.283	.029
’04 scaled score	347283.797	1	347283.797	14.182	.001	.267
Schedule type	7197.374	1	7197.374	.294	.591	.007
Error	954985.655	39	24486.812			
Total	205577211.000	42				
Corrected Total	1482396.119	41				

a *R* Squared = .356 (Adjusted *R* Squared = .323)

Table 141

Descriptive Statistics - Teacher ID 16 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2155.59	2193.243	164.879	27
2	2292.27	2224.296	171.302	15

There were 27 students enrolled in the 8-block schedule classes and 15 students enrolled in the traditional 50-minute schedule classes for Teacher 16. The adjusted mean score for Teacher 16 for the 8-block scheduled classes was 2193.243 (standard deviation = 164.879) and the adjusted mean score for the traditional 50-minute scheduled classes was 2224.296 (standard deviation = 171.302). These results are not statistically significant.

Table 142 shows the results of the analysis of covariance for Teacher 27. The *F*-value was 2.755, which was not statistically significant (p = 0.102).

Table 142

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II - Teacher ID 27 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	201274.852(a)	2	100637.426	2.941	.060	.089
Intercept	4225302.265	1	4225302.265	123.496	.000	.673
’04 scaled score	97276.374	1	97276.374	2.843	.097	.045
Schedule type	94261.381	1	94261.381	2.755	.102	.044
Error	2052844.894	60	34214.082			
Total	296169640.000	63				
Corrected Total	2254119.746	62				

a *R* Squared = .089 (Adjusted *R* Squared = .059)

Table 143

Descriptive Statistics - Teacher ID 27 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2177.58	2176.758	185.002	53
2	2066.40	2070.782	185.155	10

There were 53 students enrolled in the 8-block schedule classes and 10 students enrolled in the traditional 50-minute schedule classes for Teacher 27. The adjusted mean score for Teacher 27 for the 8-block scheduled classes was 2176.758 (standard deviation = 185.002) and the adjusted mean score for the traditional 50-minute scheduled classes was 2070.782 (standard deviation = 185.155). These results are not statistically significant.

Table 144 shows the results of the analysis of covariance for Teacher 28. The *F*-value was 1.097, which was not statistically significant (*p* = 0.299).

Table 144

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II - Teacher ID 28 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	793348.068(a)	2	396674.034	6.433	.003	.155
Intercept	321401.099	1	321401.099	5.213	.025	.069
'04 scaled score	701355.938	1	701355.938	11.375	.001	.140
Schedule type	67621.663	1	67621.663	1.097	.299	.015
Error	4316103.275	70	61658.618			
Total	336567324.000	73				
Corrected Total	5109451.342	72				

a *R* Squared = .155 (Adjusted *R* Squared = .131)

Table 145

Descriptive Statistics - Teacher ID 28 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2171.03	2165.345	248.494	32
2	2099.49	2103.926	248.454	41

There were 32 students enrolled in the 8-block schedule classes and 41 students enrolled in the traditional 50-minute schedule classes for Teacher 28. The adjusted mean score for Teacher 28 for the 8-block scheduled classes was 2165.345 (standard deviation = 248.494) and the adjusted mean score for the traditional 50-minute scheduled classes was 2103.926 (standard deviation = 248.454). These results are not statistically significant.

Tenth Graders' Mathematics TAKS Test Scores vs. Schedule Type (Algebra II Pre-Advanced Placement Students

Research Question 2.c. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 146, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for five teachers.

Table 146

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra II Pre-Advanced Placement Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
4	No
14	No
20	No
23	No
30	No

Table 147 shows the results of the analysis of covariance for Teacher 4. The *F*-value was 0.555, which was not statistically significant (p = 0.459).

Table 147

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II Pre-Advanced Placement - Teacher ID 4 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	351191.643(a)	2	175595.822	6.630	.003	.181
Intercept	798326.556	1	798326.556	30.142	.000	.334
’04 scaled score	347438.334	1	347438.334	13.118	.001	.179
Schedule type	14689.034	1	14689.034	.555	.459	.009
Error	1589139.214	60	26485.654			
Total	383899940.000	63				
Corrected Total	1940330.857	62				

a *R* Squared = .181 (Adjusted *R* Squared = .154)

Table 148

Descriptive Statistics - Teacher ID 4 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2456.23	2450.244	163.069	39
2	2472.13	2481.853	163.273	24

There were 39 students enrolled in the 8-block schedule classes and 24 students enrolled in the traditional 50-minute schedule classes for Teacher 4. The adjusted mean score for Teacher 4 for the 8-block scheduled classes was 2450.244 (standard deviation = 163.069) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2481.853 (standard deviation = 163.273). These results are not statistically significant.

Table 149 shows the results of the analysis of covariance for Teacher 14. The *F*-value was 0.220, which was not statistically significant (p = 0.641).

Table 149

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II Pre-Advanced Placement - Teacher ID 14 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	516990.542(a)	2	258495.271	8.800	.001	.257
Intercept	201033.800	1	201033.800	6.844	.012	.118
’04 scaled score	498886.728	1	498886.728	16.983	.000	.250
Schedule type	6459.156	1	6459.156	.220	.641	.004
Error	1498145.995	51	29375.412			
Total	294444573.000	54				
Corrected Total	2015136.537	53				

a *R* Squared = .257 (Adjusted *R* Squared = .227)

Table 150

Descriptive Statistics - Teacher ID 14 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2338.97	2334.210	171.543	38
2	2298.88	2310.189	187.154	19

There were 38 students enrolled in the 8-block schedule classes and 19 students enrolled in the traditional 50-minute schedule classes for Teacher 14. The adjusted mean score for Teacher 14 for the 8-block scheduled classes was 2334.210 (standard deviation = 171.543) and the adjusted mean score for the traditional 50-minute scheduled classes was 2310.189 (standard deviation = 187.154). These results are not statistically significant.

Table 151 shows the results of the analysis of covariance for Teacher 20. The *F*-value was 1.467, which was not statistically significant ($p = 0.234$).

Table 151

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II Pre-Advanced Placement - Teacher ID 20 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	105076.033(a)	2	52538.017	7.778	.002	.308
Intercept	450125.107	1	450125.107	66.640	.000	.656
’04 scaled score	101938.995	1	101938.995	15.092	.000	.301
Schedule type	9911.727	1	9911.727	1.467	.234	.040
Error	236409.677	35	6754.562			
Total	208737331.000	38				
Corrected Total	341485.711	37				

a *R* Squared = .308 (Adjusted *R* Squared = .268)

Table 152

Descriptive Statistics - Teacher ID 20 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2353.07	2362.008	82.669	15
2	2334.48	2328.647	82.503	23

There were 15 students enrolled in the 8-block schedule classes and 23 students enrolled in the traditional 50-minute schedule classes for Teacher 20. The adjusted mean score for Teacher 20 for the 8-block scheduled classes was 2362.008 (standard deviation = 82.669) and the adjusted mean score for the traditional 50-minute scheduled classes was 2328.647 (standard deviation = 82.503). These results are not statistically significant.

Table 153 shows the results of the analysis of covariance for Teacher 23. The *F*-value was 4.027, which was not statistically significant ($p = 0.060$).

Table 153

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II Pre-Advanced Placement - Teacher ID 23 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	167802.254(a)	2	83901.127	3.887	.040	.302
Intercept	195856.569	1	195856.569	9.074	.007	.335
’04 scaled score	18311.063	1	18311.063	.848	.369	.045
Schedule type	86920.300	1	86920.300	4.027	.060	.183
Error	388500.889	18	21583.383			
Total	132602507.000	21				
Corrected Total	556303.143	20				

a *R* Squared = .302 (Adjusted *R* Squared = .224)

Table 154

Descriptive Statistics - Teacher ID 23 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2615.13	2597.828	156.220	8
2	2441.38	2452.029	152.706	13

There were 8 students enrolled in the 8-block schedule classes and 13 students enrolled in the traditional 50-minute schedule classes for Teacher 23. The adjusted mean score for Teacher 23 for the 8-block scheduled classes was 2597.828 (standard deviation = 156.220) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2452.029 (standard deviation = 152.706). These results are not statistically significant.

Table 155 shows the results of the analysis of covariance for Teacher 30. The *F*-value was 0.199, which was not statistically significant (p = 0.658).

Table 155

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra II Pre-Advanced Placement - Teacher ID 30 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	182064.816(a)	2	91032.408	7.838	.001	.250
Intercept	279702.653	1	279702.653	24.083	.000	.339
’04 scaled score	176605.257	1	176605.257	15.206	.000	.244
Schedule type	2305.628	1	2305.628	.199	.658	.004
Error	545857.684	47	11613.993			
Total	268573435.000	50				
Corrected Total	727922.500	49				

a *R* Squared = .250 (Adjusted *R* Squared = .218)

Table 156

Descriptive Statistics - Teacher ID 30 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2307.00	2319.581	109.348	33
2	2329.06	2304.636	110.821	17

There were 33 students enrolled in the 8-block schedule classes and 17 students enrolled in the traditional 50-minute schedule classes for Teacher 30. The adjusted mean score for Teacher 30 for the 8-block scheduled classes was 2319.581 (standard deviation = 109.348) and the adjusted mean score for the traditional 50-minute scheduled classes was 2304.636 (standard deviation = 110.821). These results are not statistically significant.

Eleventh Graders' Mathematics TAKS Test Scores vs. Schedule Type (Algebra III Students)

Research Question 2.d. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 157, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for two teachers.

Table 157

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Algebra III Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
5	No
22	No

Table 158 shows the results of the analysis of covariance for Teacher 5. The *F*-value was 0.220 which was not statistically significant (p = 0.641).

Table 158

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra III - Teacher ID 5 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	228316.762(a)	2	114158.381	13.179	.000	.324
Intercept	228618.379	1	228618.379	26.393	.000	.324
priorscale	227965.396	1	227965.396	26.317	.000	.324
Section	1902.729	1	1902.729	.220	.641	.004
Error	476421.238	55	8662.204			
Total	306458466.000	58				
Corrected Total	704738.000	57				

a *R* Squared = .324 (Adjusted *R* Squared = .299)

Table 159

Descriptive Statistics - Teacher ID 5 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2294.28	2300.032	93.331	39
2	2299.53	2287.723	93.612	19

There were 39 students enrolled in the 8-block schedule classes and 19 students enrolled in the traditional 50-minute schedule classes for Teacher 5. The adjusted mean score for Teacher 5 for the 8-block scheduled classes was 2300.032 (standard deviation = 93.331) and the adjusted mean score for the traditional 50-minute scheduled

classes was 2287.723 (standard deviation = 93.612). These results are not statistically significant.

Table 160 shows the results of the analysis of covariance for Teacher 22. The *F*-value was 0.457 which was not statistically significant (p = 0.504).

Table 160

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Algebra III - Teacher ID 22 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	165871.589(a)	2	82935.795	1.903	.166	.109
Intercept	59908.045	1	59908.045	1.374	.250	.042
’04 scaled score	165144.977	1	165144.977	3.789	.061	.109
Schedule type	19907.111	1	19907.111	.457	.504	.015
Error	1351199.381	31	43587.077			
Total	177183603.000	34				
Corrected Total	1517070.971	33				

a *R* Squared = .109 (Adjusted *R* Squared = .052)

Table 161

Descriptive Statistics - Teacher ID 22 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2267.15	2240.959	214.339	13
2	2276.67	2292.883	212.242	21

There were 13 students enrolled in the 8-block schedule classes and 21 students enrolled in the traditional 50-minute schedule classes for Teacher 22. The adjusted mean score for Teacher 2 for the 8-block scheduled classes was 2240.959 (standard deviation = 214.339) and the adjusted mean score for the traditional 50-minute scheduled classes was 2292.883 (standard deviation = 212.242). These results are not statistically significant.

Tenth Graders' Mathematics Test Scores vs. Schedule Type (Geometry Students)

Research Question 2.e. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 162, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for seven teachers.

Table 162

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Geometry Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
8	No
9	No
10	No
11	No
17	No
29	No
31	No

Table 163 shows the results of the analysis of covariance for Teacher 8. The *F*-value was 1.049 which was not statistically significant ($p = 0.310$).

Table 163

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 8 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	249815.640(a)	2	124907.820	7.348	.001	.199
Intercept	4412529.808	1	4412529.808	259.579	.000	.815
’04 scaled score	196049.960	1	196049.960	11.533	.001	.164
Schedule type	17826.773	1	17826.773	1.049	.310	.017
Error	1002927.780	59	16998.776			
Total	284896978.000	62				
Corrected Total	1252743.419	61				

a *R* Squared = .199 (Adjusted *R* Squared = .172)

Table 164

Descriptive Statistics - Teacher ID 8 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2120.07	2127.809	131.252	44
2	2184.94	2166.022	132.506	18

There were 44 students enrolled in the 8-block schedule classes and 18 students enrolled in the traditional 50-minute schedule classes for Teacher 8. The adjusted mean score for Teacher 8 for the 8-block scheduled classes was 2127.809 (standard deviation = 131.252) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2166.022 (standard deviation = 132.506). These results are not statistically significant.

Table 165 shows the results of the analysis of covariance for Teacher 9. The *F*-value was 0.484 which was not statistically significant ($p = 0.488$).

Table 165

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 9 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1462899.574(a)	2	731449.787	43.813	.000	.480
Intercept	3949676.413	1	3949676.413	236.581	.000	.713
’04 scaled score	1458678.155	1	1458678.155	87.373	.000	.479
Schedule type	8080.409	1	8080.409	.484	.488	.005
Error	1586006.600	95	16694.806			
Total	460740063.000	98				
Corrected Total	3048906.173	97				

a *R* Squared = .480 (Adjusted *R* Squared = .469)

Table 166

Descriptive Statistics - Teacher ID 9 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2156.42	2154.620	129.214	65
2	2170.30	2173.838	129.224	33

There were 65 students enrolled in the 8-block schedule classes and 33 students enrolled in the traditional 50-minute schedule classes for Teacher 9. The adjusted mean score for Teacher 9 for the 8-block scheduled classes was 2154.620 (standard deviation = 129.214) and the adjusted mean score for the traditional 50-minute scheduled classes was 2173.838 (standard deviation = 129.224). These results are not statistically significant.

Table 167 shows the results of the analysis of covariance for Teacher 10. The *F*-value was 0.003 which was not statistically significant ($p = 0.958$).

Table 167

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 10 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	123754.306(a)	2	61877.153	3.264	.062	.266
Intercept	5891610.577	1	5891610.577	310.822	.000	.945
’04 scaled score	115307.159	1	115307.159	6.083	.024	.253
Schedule type	55.104	1	55.104	.003	.958	.000
Error	341188.647	18	18954.925			
Total	98498711.000	21				
Corrected Total	464942.952	20				

a R Squared = .266 (Adjusted R Squared = .185)

Table 168

Descriptive Statistics - Teacher ID 10 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2183.78	2162.546	140.079	9
2	2143.25	2159.174	139.482	12

There were 9 students enrolled in the 8-block schedule classes and 12 students enrolled in the traditional 50-minute schedule classes for Teacher 10. The adjusted mean score for Teacher 10 for the 8-block scheduled classes was 2162.546 (standard deviation = 140.079) and the adjusted mean score for the traditional 50-minute scheduled classes was 2159.174 (standard deviation = 139.482). These results are not statistically significant.

Table 169 shows the results of the analysis of covariance for Teacher 11. The *F*-value was 0.252 which was not statistically significant ($p = 0.618$).

Table 169

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 11 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	707166.690(a)	2	353583.345	9.709	.000	.338
Intercept	593.759	1	593.759	.016	.899	.000
’04 scaled score	707016.509	1	707016.509	19.413	.000	.338
Schedule type	9187.957	1	9187.957	.252	.618	.007
Error	1383946.919	38	36419.656			
Total	187040538.000	41				
Corrected Total	2091113.610	40				

a *R* Squared = .338 (Adjusted *R* Squared = .303)

Table 170

Descriptive Statistics - Teacher ID 11 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2126.18	2105.967	191.744	17
2	2122.29	2136.607	191.501	24

There were 17 students enrolled in the 8-block schedule classes and 24 students enrolled in the traditional 50-minute schedule classes for Teacher 11. The adjusted mean score for Teacher 11 for the 8-block scheduled classes was 2105.967 (standard deviation = 191.744) and the adjusted mean score for the traditional 50-minute scheduled classes was 2136.607 (standard deviation = 191.501). These results are not statistically significant.

Table 171 shows the results of the analysis of covariance for Teacher 17. The *F*-value was 1.140 which was not statistically significant (p = 0.289).

Table 171

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 17 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	837633.069(a)	2	418816.534	16.990	.000	.321
Intercept	2102493.345	1	2102493.345	85.293	.000	.542
’04 scaled score	801658.482	1	801658.482	32.521	.000	.311
Schedule type	28105.870	1	28105.870	1.140	.289	.016
Error	1774814.851	72	24650.206			
Total	362687962.000	75				
Corrected Total	2612447.920	74				

a *R* Squared = .321 (Adjusted *R* Squared = .302)

Table 172

Descriptive Statistics - Teacher ID 17 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2156.00	2160.068	157.036	21
2	2204.78	2203.196	157.015	54

There were 21 students enrolled in the 8-block schedule classes and 54 students enrolled in the traditional 50-minute schedule classes for Teacher 17. The adjusted mean score for Teacher 17 for the 8-block scheduled classes was 2160.068 (standard deviation = 157.036) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2203.196 (standard deviation = 157.015). These results are not statistically significant.

Table 173 shows the results of the analysis of covariance for Teacher 29. The *F*-value was 0.144 which was not statistically significant (p = 0.706).

Table 173

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 29 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	916741.621(a)	2	458370.810	21.492	.000	.443
Intercept	1002355.751	1	1002355.751	46.997	.000	.465
’04 scaled score	905943.516	1	905943.516	42.477	.000	.440
Schedule type	3071.983	1	3071.983	.144	.706	.003
Error	1151706.309	54	21327.895			
Total	269660448.000	57				
Corrected Total	2068447.930	56				

a *R* Squared = .443 (Adjusted *R* Squared = .423)

Table 174

Descriptive Statistics - Teacher ID 29 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2181.73	2174.728	146.143	26
2	2154.10	2159.970	246.126	31

There were 26 students enrolled in the 8-block schedule classes and 31 students enrolled in the traditional 50-minute schedule classes for Teacher 29. The adjusted mean score for Teacher 29 for the 8-block scheduled classes was 2174.728 (standard deviation = 146.143) and the adjusted mean score for the traditional 50-minute scheduled classes was 2159.970 (standard deviation = 246.126). These results are not statistically significant.

Table 175 shows the results of the analysis of covariance for Teacher 31. The *F*-value was 1.667 which was not statistically significant ($p = 0.203$).

Table 175

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry - Teacher ID 31 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	525650.863(a)	2	262825.431	8.725	.001	.275
Intercept	6440852.552	1	6440852.552	213.807	.000	.823
’04 scaled score	397130.329	1	397130.329	13.183	.001	.223
Schedule type	50231.918	1	50231.918	1.667	.203	.035
Error	1385732.974	46	30124.630			
Total	230227801.000	49				
Corrected Total	1911383.837	48				

a *R* Squared = .275 (Adjusted *R* Squared = .243)

Table 176

Descriptive Statistics - Teacher ID 31 Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2110.42	2127.847	175.279	26
2	2213.04	2193.347	175.503	23

There were 26 students enrolled in the 8-block schedule classes and 23 students enrolled in the traditional 50-minute schedule classes for Teacher 30. The adjusted mean score for Teacher 30 for the 8-block scheduled classes was 2127.847 (standard deviation = 175.279) and the adjusted mean score for the traditional 50-minute scheduled classes was 2193.347 (standard deviation = 175.503). These results are not statistically significant.

Ninth Graders' Mathematics TAKS Test Scores vs. Schedule Type (Geometry Pre-Advanced Placement Students)

Research Question 2.f. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 177, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for two teachers.

Table 177

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Geometry Pre-Advanced Placement Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
12	No
15	No

Table 178 shows the results of the analysis of covariance for Teacher 12. The *F*-value was 0.235 which was not statistically significant (p = 0.629).

Table 178

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry Pre-Advanced Placement - Teacher ID 12 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2483939.553(a)	2	1241969.777	33.295	.000	.309
Intercept	96766.170	1	96766.170	2.594	.109	.017
’04 scaled score	2428883.203	1	2428883.203	65.115	.000	.304
Schedule type	8766.405	1	8766.405	.235	.629	.002
Error	5557948.282	149	37301.666			
Total	851909263.000	152				
Corrected Total	8041887.836	151				

a *R* Squared = .309 (Adjusted *R* Squared = .300)

Table 179

Descriptive Statistics - Teacher ID 12 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2342.69	2350.799	193.400	101
2	2383.00	2366.948	193.661	51

There were 101 students enrolled in the 8-block schedule classes and 51 students enrolled in the traditional 50-minute schedule classes for Teacher 12. The adjusted mean score for Teacher 12 for the 8-block scheduled classes was 2350.799

(standard deviation = 193.400) and the adjusted mean score for the traditional 50-minute scheduled classes was 2366.948 (standard deviation = 193.661). These results are not statistically significant.

Table 180 shows the results of the analysis of covariance for Teacher 15. The *F*-value was 0.028 which was not statistically significant (p = 0.867).

Table 180

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Geometry Pre-Advanced Placement - Teacher ID 15 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	4967669.091(a)	2	2483834.546	68.835	.000	.700
Intercept	4389101.010	1	4389101.010	121.635	.000	.673
’04 scaled score	4819720.313	1	4819720.313	133.569	.000	.694
Schedule type	1018.964	1	1018.964	.028	.867	.000
Error	2128962.280	59	36084.106			
Total	348397407.000	62				
Corrected Total	7096631.371	61				

a *R* Squared = .700 (Adjusted *R* Squared = .690)

Table 181

Descriptive Statistics - Teacher ID 15 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2400.07	2350.766	191.293	28
2	2301.91	2342.516	191.057	34

There were 28 students enrolled in the 8-block schedule classes and 34 students enrolled in the traditional 50-minute schedule classes for Teacher 15. The adjusted mean score for Teacher 15 for the 8-block scheduled classes was 2350.766 (standard deviation = 191.293) and the adjusted mean score for the traditional 50-minute scheduled classes was 2342.516 (standard deviation = 191.057). These results are not statistically significant.

Eleventh Graders' Mathematics TAKS Test Scores vs. Schedule Type (Pre-Calculus Pre-Advanced Placement Students)

Research Question 2.g. asks, "Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?" As shown in Table 182, there were no statistically significant differences between the scaled scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for three teachers.

Table 182

Rejection of the Null Hypothesis based on Analyses of Covariance conducted for Pre-Calculus Pre-Advanced Placement Course, by Teacher

Teacher ID	Texas Assessment of Knowledge and Skills
13	No
21	No
26	No

Table 183 shows the results of the analysis of covariance for Teacher 13. The *F*-value was 0.017 which was not statistically significant (p = 0.896).

Table 183

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Pre-Calculus pre-Advanced Placement - Teacher ID 13 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	231594.482(a)	2	115797.241	6.069	.004	.186
Intercept	549264.500	1	549264.500	28.789	.000	.352
’04 scaled score	222618.035	1	222618.035	11.668	.001	.180
Schedule type	326.676	1	326.676	.017	.896	.000
Error	1011197.643	53	19079.201			
Total	344520385.000	56				
Corrected Total	1242792.125	55				

a *R* Squared = .186 (Adjusted *R* Squared = .156)

Table 184

Descriptive Statistics - Teacher ID 13 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2463.21	2478.359	140.103	28
2	2488.54	2473.391	140.103	28

There were 28 students enrolled in the 8-block schedule classes and 28 students enrolled in the traditional 50-minute schedule classes for Teacher 13. The adjusted mean score for Teacher 13 for the 8-block scheduled classes was 2478.359 (standard deviation = 140.103) and the adjusted mean score for the traditional 50-minute scheduled classes was 2473.391 (standard deviation = 140.103). These results are not statistically significant.

Table 185 shows the results of the analysis of covariance for Teacher 21. The *F*-value was 1.653 which was not statistically significant ($p = 0.207$).

Table 185

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Pre-Calculus Pre-Advanced Placement - Teacher ID 21 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	265741.577(a)	2	132870.789	7.753	.002	.307
Intercept	126541.721	1	126541.721	7.384	.010	.174
’04 scaled score	185618.855	1	185618.855	10.831	.002	.236
Schedule type	28334.325	1	28334.325	1.653	.207	.045
Error	599793.502	35	17136.957			
Total	220586341.000	38				
Corrected Total	865535.079	37				

a *R* Squared = .307 (Adjusted *R* Squared = .267)

Table 186

Descriptive Statistics - Teacher ID 21 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2476.55	2448.744	133.872	11
2	2375.30	2386.623	132.123	27

There were 11 students enrolled in the 8-block schedule classes and 27 students enrolled in the traditional 50-minute schedule classes for Teacher 21. The adjusted mean score for Teacher 21 for the 8-block scheduled classes was 2448.744 (standard deviation = 133.872) and the adjusted mean score for the traditional 50-minute

scheduled classes was 2386.623 (standard deviation = 132.123). These results are not statistically significant.

Table 187 shows the results of the analysis of covariance for Teacher 26. The *F*-value was 1.235 which was not statistically significant (p = 0.271).

Table 187

Analysis of Covariance: Effect on Performance on the Texas Assessment of Knowledge and Skills by Course for Pre-Calculus Pre-Advanced Placement - Teacher ID 26 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2004176.447(a)	2	1002088.223	63.217	.000	.664
Intercept	132153.414	1	132153.414	8.337	.005	.115
’04 scaled score	1967455.939	1	1967455.939	124.118	.000	.660
Schedule type	19582.673	1	19582.673	1.235	.271	.019
Error	1014498.061	64	15851.532			
Total	375596824.000	67				
Corrected Total	3018674.507	66				

a *R* Squared = .664 (Adjusted *R* Squared = .653)

Table 188

Descriptive Statistics - Teacher ID 26 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2318.00	2328.810	125.965	17
2	2371.80	2368.125	125.926	50

There were 17 students enrolled in the 8-block schedule classes and 50 students enrolled in the traditional 50-minute schedule classes for Teacher 26. The adjusted mean score for Teacher 26 for the 8-block scheduled classes was 2328.810 (standard deviation = 125.965) and the adjusted mean score for the traditional 50-minute scheduled classes was 2368.125 (standard deviation = 125.926). These results are not statistically significant.

District Level Comparisons: Aggregate Analyses for Texas Assessment of Knowledge and Skills Test Scores vs. Schedule Type

Research Question 2.h. asks. “Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?” Research Question 2.i. asks, “Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?” And research Question 2.j. asks, “Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?”

The results of student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills were investigated for each type of mathematics course across the district as a whole. Each mathematics course typically has one particular grade level of students enrolled. Tables 189 through 202 highlight the results of the statistical tests of significance for the district level aggregated performance on the Texas Assessment of Knowledge and Skills. None of these analyses produced a statistically significant result for the effect of schedule type on student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills at the district level indicating at this level, there is no effect of schedule type on student performance. Analyses of covariance were also conducted to assess campus level student performance on the mathematics portion on the Texas Assessment of Knowledge and Skills. None of the analyses conducted by campus for each course produced a statistically significant result for the effect of schedule type on student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills at the campus level indicating at this level, there is no effect of schedule type on student performance.

Ninth graders: District TAKS performance by schedule type (Algebra I students).

Table 189 shows the results of the analysis of covariance for 9th grade students enrolled in Algebra I and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The F-value was 0.172, which was not statistically significant ($p = 0.679$).

Table 189

Analysis of Covariance Algebra I District Level Comparison – Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	15548022.681(a)	2	7774011.340	125.322	.000	.370
Intercept	10120977.545	1	10120977.545	163.157	.000	.276
’04 scaled score	15327269.860	1	15327269.860	247.086	.000	.367
Schedule type	10647.354	1	10647.354	.172	.679	.000
Error	26487726.810	427	62032.147			
Total	1878325583.000	430				
Corrected Total	42035749.491	429				

a *R* Squared = .370 (Adjusted *R* Squared = .367)

Table 190

Descriptive Statistics - Algebra I District Level - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2040.80	2060.834	249.670	188
2	2086.48	2070.910	249.539	242

There were 188 students enrolled in the 8-block schedule Algebra I classes and 242 students enrolled in the traditional 50-minute schedule Algebra I classes across the district. The adjusted mean score for the 8-block scheduled classes was 2060.834 (standard deviation = 249.670) and the adjusted mean score for the traditional 50-

minute scheduled classes was 2070.910 (standard deviation = 249.539). These results are not statistically significant.

Eleventh graders: District TAKS performance by schedule type (Algebra II students).

Table 191 shows the results of the analysis of covariance for exit-level 11th grade students enrolled in Algebra II and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The *F*-value was 0.353, which was not statistically significant ($p = 0.553$).

Table 191

Analysis of Covariance Algebra II District Level Comparison – Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2363516.697(a)	2	1181758.348	17.962	.000	.115
Intercept	9166246.443	1	9166246.443	139.320	.000	.335
’04 scaled score	2278902.059	1	2278902.059	34.637	.000	.112
Schedule type	23257.802	1	23257.802	.353	.553	.001
Error	18158864.658	276	65792.988			
Total	1291626737.000	279				
Corrected Total	20522381.355	278				

a *R* Squared = .115 (Adjusted *R* Squared = .109)

Table 192

Descriptive Statistics - Algebra II District Level - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2120.73	2127.231	256.907	172
2	2156.54	2146.086	257.154	107

There were 172 students enrolled in the 8-block schedule Algebra II classes and 107 students enrolled in the traditional 50-minute schedule Algebra II classes across the district. The adjusted mean score for the 8-block scheduled classes was 2127.231 (standard deviation = 256.907) and the adjusted mean score for the traditional 50-minute scheduled classes was 2146.086 (standard deviation = 257.154). These results are not statistically significant.

Tenth graders: District TAKS performance by schedule type (Algebra II Pre-Advanced Placement students).

Table 193 shows the results of the analysis of covariance for 10th grade students enrolled in Algebra II Pre-Advanced Placement and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The *F*-value was 0.361, which was not statistically significant (p = 0.548).

Table 193

Analysis of Covariance Algebra II Pre-Advanced Placement District Level Comparison – Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1877313.652(a)	2	938656.826	42.780	.000	.277
Intercept	1506059.655	1	1506059.655	68.640	.000	.235
’04 scaled score	1875475.005	1	1875475.005	85.477	.000	.277
Schedule type	7929.309	1	7929.309	.361	.548	.002
Error	4892925.445	223	21941.370			
Total	1288257786.000	226				
Corrected Total	6770239.097	225				

a *R* Squared = .277 (Adjusted *R* Squared = .271)

Table 194

Descriptive Statistics - Algebra II Pre-Advanced Placement District Level Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2383.62	2386.195	148.159	133
2	2377.83	2374.151	148.175	93

There were 133 students enrolled in the 8-block schedule Algebra II Pre-Advanced Placement classes and 93 students enrolled in the traditional 50-minute schedule Algebra II Pre-Advanced Placement classes across the district. The adjusted mean score for the 8-block scheduled classes was 2386.195 (standard deviation =

148.159) and the adjusted mean score for the traditional 50-minute scheduled classes was 2374.151 (standard deviation = 148.175). These results are not statistically significant.

Eleventh graders: District TAKS performance by schedule type (Algebra III students).

Table 195 shows the results of the analysis of covariance for exit-level 11th grade students enrolled in Algebra III and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The *F*-value was 0.004, which was not statistically significant (p = 0.952).

Table 195

Analysis of Covariance Algebra III District Level Comparison – Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	369216.610(a)	2	184608.305	8.815	.000	.165
Intercept	329910.970	1	329910.970	15.753	.000	.150
’04 scaled score	369216.596	1	369216.596	17.630	.000	.165
Schedule type	76.415	1	76.415	.004	.952	.000
Error	1863902.379	89	20942.723			
Total	483642069.000	92				
Corrected Total	2233118.989	91				

a *R* Squared = .165 (Adjusted *R* Squared = .147)

Table 196

Descriptive Statistics - Algebra III District Level - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2287.50	2286.711	144.720	52
2	2287.53	2288.550	144.725	40

There were 52 students enrolled in the 8-block schedule Algebra III classes and 40 students enrolled in the traditional 50-minute schedule Algebra III classes across the district. The adjusted mean score for the 8-block scheduled classes was 2286.711 (standard deviation = 144.720) and the adjusted mean score for the traditional 50-minute scheduled classes was 2288.550 (standard deviation = 144.725). These results are not statistically significant.

Tenth graders: District TAKS performance by schedule type (Geometry students).

Table 197 shows the results of the analysis of covariance for 10th grade students enrolled in Geometry and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The *F*-value was 1.030, which was not statistically significant ($p = 0.311$).

Table 197

Analysis of Covariance Geometry District Level Comparison – Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	5386258.008(a)	2	2693129.004	72.471	.000	.262
Intercept	24350084.906	1	24350084.906	655.250	.000	.616
’04 scaled score	5269089.117	1	5269089.117	141.789	.000	.257
Schedule type	38289.998	1	38289.998	1.030	.311	.003
Error	15199056.196	409	37161.507			
Total	1920250948.000	412				
Corrected Total	20585314.204	411				

a *R* Squared = .262 (Adjusted *R* Squared = .258)

Table 198

Descriptive Statistics - Geometry District Level - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2131.22	2138.085	192.956	215
2	2164.99	2157.427	192.976	196

There were 215 students enrolled in the 8-block schedule Geometry classes and 196 students enrolled in the traditional 50-minute schedule Geometry classes across the district. The adjusted mean score for the 8-block scheduled classes was 2138.085 (standard deviation = 192.956) and the adjusted mean score for the traditional 50-

minute scheduled classes was 2157.427 (standard deviation = 192.976). These results are not statistically significant.

Ninth graders: District TAKS performance by schedule type (Geometry Pre-Advanced Placement students).

Table 199 shows the results of the analysis of covariance for 9th grade students enrolled in Geometry Pre-Advanced Placement and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The *F*-value was 0.824, which was not statistically significant (p = 0.365).

Table 199

Analysis of Covariance Geometry Pre-Advanced Placement District Level Comparison – Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	7076266.064(a)	2	3538133.032	92.547	.000	.467
Intercept	4209870.804	1	4209870.804	110.118	.000	.343
’04 scaled score	7075190.057	1	7075190.057	185.067	.000	.467
Schedule type	31520.718	1	31520.718	.824	.365	.004
Error	8066635.038	211	38230.498			
Total	1200306670.000	214				
Corrected Total	15142901.103	213				

a *R* Squared = .467 (Adjusted *R* Squared = .462)

Table 200

Descriptive Statistics - Geometry Pre-Advanced Placement District Level

Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2355.15	2343.445	195.775	129
2	2350.56	2368.325	195.900	85

There were 129 students enrolled in the 8-block schedule Geometry Pre-Advanced Placement classes and 85 students enrolled in the traditional 50-minute schedule Geometry Pre-Advanced Placement classes across the district. The adjusted mean score for the 8-block scheduled classes was 2343.445 (standard deviation = 195.775) and the adjusted mean score for the traditional 50-minute scheduled classes was 2368.325 (standard deviation = 195.900). These results are not statistically significant.

Eleventh graders: District TAKS performance by schedule type (Pre-Calculus Pre-Advanced Placement students).

Table 201 shows the results of the analysis of covariance for exit-level 11th grade students enrolled in Pre-Calculus Pre-Advanced Placement and their performance on the Texas Assessment of Knowledge and Skills aggregated at the district level. The *F*-value was 0.754, which was not statistically significant (p = 0.386).

Table 201

Analysis of Covariance Pre-Calculus Pre-Advanced Placement District Level Comparison Texas Assessment of Knowledge and Skills - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2614770.804(a)	2	1307385.402	70.345	.000	.471
Intercept	574562.549	1	574562.549	30.915	.000	.164
’04 scaled score	2603040.839	1	2603040.839	140.059	.000	.470
Schedule type	14018.272	1	14018.272	.754	.386	.005
Error	2936478.575	158	18585.307			
Total	940703550.000	161				
Corrected Total	5551249.379	160				

a *R* Squared = .471 (Adjusted *R* Squared = .464)

Table 202

Descriptive Statistics - Pre-Calculus Pre-Advanced Placement District Level Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2421.75	2422.840	136.331	56
2	2403.83	2403.247	136.325	105

There were 56 students enrolled in the 8-block schedule Pre-Calculus Pre-Advanced Placement classes and 105 students enrolled in the traditional 50-minute schedule Pre-Calculus Pre-Advanced Placement classes across the district. The adjusted mean score for the 8-block scheduled classes was 2422.840 (standard deviation = 136.331) and the adjusted mean score for the traditional 50-minute scheduled classes was 2403.247 (standard deviation = 136.325). These results are not statistically significant.

Comparisons by Ethnic Subgroup and Gender: Aggregate Analyses

Research Question 2.k. asks, “Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?”. Research Question 2.l asks, “Is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?” Results of performance on the mathematics portion of the Texas Assessment of Knowledge and Skills were analyzed by disaggregating the student data by ethnic subgroup and by gender. An analysis of covariance was conducted for each teacher and mathematics course, including Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement, for each ethnic group and gender group. The number of resulting tests with statistically significant returns appeared to be random in that no pattern can be detected when examining data by course, by teacher, or by demographic group. Tables 203 through 219 highlight the statistically significant results that were returned from the analyses of covariance for scaled score performance on the mathematics portion of the Texas Assessment of Knowledge and Skills for each subgroup of ethnicity and gender. Of the analyses of covariance conducted based on ethnicity, one of the 93 statistical tests generated a statistically significant result. Of the analyses of covariance conducted based on gender, five of 62 statistical tests generated a statistically significant result.

Table 203

Significant Results for Performance on the Texas Assessment of Knowledge and Skills by Subgroup Population Produced by Analysis of Covariance

Teacher ID	Course	Subgroup 1	Subgroup 2
18	Algebra I	Female (n = 31)	
24	Algebra I	Male* (n = 36)	Hispanic* (n = 18)
7	Algebra II	Male* (n = 23)	
10	Geometry	Male (n = 13)	
21	Pre-Calculus Pre-Advanced Placement	Female* (n = 19)	

Boxes marked with an asterisk (*) indicate a statistically significant result at the 0.05 alpha level, but where a Levene's test also returned a significant result.

Ninth graders' mathematics TAKS test scores vs. schedule type by ethnic subgroup and gender (Algebra I students).

Table 204 shows the results of the analysis of covariance for performance on the Texas Assessment of Knowledge and Skills for female students in Algebra I with Teacher 18. The *F*-value was 4.260, which was statistically significant (p = 0.048).

Table 204

Analysis of Covariance Algebra I Female Students – Teacher ID 18 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1367890.651(a)	2	683945.325	24.029	.000	.632
Intercept	699053.392	1	699053.392	24.560	.000	.467
priorscale	1339071.101	1	1339071.101	47.045	.000	.627
Section	121260.989	1	121260.989	4.260	.048	.132
Error	796981.736	28	28463.633			
Total	145367788.000	31				
Corrected Total	2164872.387	30				

a *R* Squared = .632 (Adjusted *R* Squared = .606)

Table 205

Descriptive Statistics - Algebra I Female Students Teacher ID 18

Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2178.81	2210.598	169.728	16
2	2117.80	2083.395	169.795	15

There were 16 female students enrolled in the 8-block schedule Algebra I classes and 15 female students enrolled in the traditional 50-minute schedule Algebra I classes for Teacher 18. The adjusted mean score for the 8-block scheduled classes was 2210.598 (standard deviation = 169.728) and the adjusted mean score for the traditional 50-minute scheduled classes was 2083.395 (standard deviation = 169.795). These adjusted mean scores are not statistically significant on a Levene's test and the analysis of covariance did produce statistically significant results. In this analysis, based on the results of the Levene's test, there was no significant difference between the variances of the two groups ($p = 0.519$). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the 8-block schedule earning a higher mean score than students on the traditional 50-minute schedule.

Table 206 shows the results of the analysis of covariance for course grade for male students in Algebra I with Teacher 24. The F-value was 5.106 which was statistically significant ($p = 0.031$).

Table 206

Analysis of Covariance Algebra I Male Students – Teacher ID 24 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	4720558.190(a)	2	2360279.095	14.698	.000	.471
Intercept	62288.455	1	62288.455	.388	.538	.012
priorscale	3624125.844	1	3624125.844	22.568	.000	.406
Section	820030.397	1	820030.397	5.106	.031	.134
Error	5299412.116	33	160588.246			
Total	161954355.000	36				
Corrected Total	10019970.306	35				

a *R* Squared = .471 (Adjusted *R* Squared = .439)

Table 207

Descriptive Statistics - Algebra I Male Students Teacher ID 24

Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	1822.23	1853.075	401.417	13
2	2185.57	2168.131	401.119	23

There were 13 male students enrolled in the 8-block schedule Algebra I classes and 23 male students enrolled in the traditional 50-minute schedule Algebra I classes for Teacher 24. The adjusted mean score for the 8-block scheduled classes was 1853.075 (standard deviation = 401.417) and the adjusted mean score for the traditional 50-minute scheduled classes was 2168.131 (standard deviation = 401.119). The analysis of covariance did produce statistically significant results, although the adjusted mean scores are statistically significant on a Levene's test of equality of error variances, as shown in the Table 208 below. In this analysis the *F*-value was 5.490 and $p = 0.025$.

Table 208

Levene's Test of Equality of Error Variances

Algebra I Male Students - Teacher ID 24

Dependent Variable: TAKS scaled score

F	*df1*	*df2*	Sig.
5.490	1	34	.025

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills for this teacher and mathematics class.

Table 209 shows the results of the analysis of covariance for course grade for Hispanic students in Algebra I with Teacher 24. The *F*-value was 5.687 which was statistically significant ($p = 0.031$).

Table 209

Analysis of Covariance Algebra I Hispanic Students – Teacher ID 24 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	2157739.150(a)	2	1078869.575	3.875	.044	.341
Intercept	1204024.463	1	1204024.463	4.324	.055	.224
priorscale	12096.257	1	12096.257	.043	.838	.003
Section	1583491.844	1	1583491.844	5.687	.031	.275
Error	4176437.350	15	278429.157			
Total	70371421.000	18				
Corrected Total	6334176.500	17				

a *R* Squared = .341 (Adjusted *R* Squared = .253)

Table 210

Descriptive Statistics - Algebra I Hispanic Students Teacher ID 24 Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	1240.25	1264.708	577.50	4
2	2070.71	2063.726	542.373	14

There were 4 Hispanic students enrolled in the 8-block schedule Algebra I classes and 14 Hispanic students enrolled in the traditional 50-minute schedule Algebra I classes for Teacher 24. The adjusted mean score for the 8-block scheduled classes was 1264.708 (standard deviation = 577.50) and the adjusted mean score for the traditional 50-minute scheduled classes was 2063.726 (standard deviation = 542.373).

The analysis of covariance did produce statistically significant results, although the adjusted mean scores are statistically significant on a Levene's test of equality of error variances, as shown in the Table 211 below. In this analysis the *F*-value was 8.601 and *p* = 0.010.

Table 211

Levene's Test of Equality of Error Variances

Algebra I Hispanic Students - Teacher ID 24

Dependent Variable: TAKS scaled score

F	*df1*	*df2*	Sig.
8.601	1	16	.010

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills for this teacher and mathematics class. In addition, the low *n* values should be noted as these values violate another important assumption of the analysis of covariance test and call into question the validity of the results.

Eleventh graders' mathematics TAKS test scores vs. schedule type by ethnic subgroup and gender (Algebra II students).

Table 212 shows the results of the analysis of covariance for course grade for male students in Algebra II with Teacher 7. The *F*-value was 4.746 which was statistically significant ($p = 0.042$).

Table 212

Analysis of Covariance Algebra II Male Students – Teacher ID 7 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1014321.720(a)	2	507160.860	5.159	.016	.340
Intercept	3586409.092	1	3586409.092	36.485	.000	.646
priorscale	207973.734	1	207973.734	2.116	.161	.096
Section	466519.315	1	466519.315	4.746	.042	.192
Error	1965979.932	20	98298.997			
Total	99596806.000	23				
Corrected Total	2980301.652	22				

a *R* Squared = .340 (Adjusted *R* Squared = .274)

Table 213

Descriptive Statistics - Algebra II Male Students Teacher ID 7

Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	1854.00	1890.885	324.611	11
2	2228.83	2195.022	323.703	12

There were 11 male students enrolled in the 8-block schedule Algebra II classes and 12 male students enrolled in the traditional 50-minute schedule Algebra II classes for Teacher 7. The adjusted mean score for the 8-block scheduled classes was 1890.885 (standard deviation = 324.611) and the adjusted mean score for the traditional 50-minute scheduled classes was 2195.022 (standard deviation = 323.703). The analysis of covariance did produce statistically significant results, although the adjusted mean scores are statistically significant on a Levene’s test of equality of error variances, as shown in the Table 214 below. In this analysis the *F*-value was 37.750 and *p* = 0.000.

Table 214

Levene's Test of Equality of Error Variances

Algebra II Male Students - Teacher ID 7

Dependent Variable: TAKS scaled score

F	*df1*	*df2*	Sig.
37.750	1	21	.000

The Levene’s test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills for this teacher and mathematics class.

Tenth graders' mathematics TAKS test scores vs. schedule type by ethnic subgroup and gender (Geometry students).

Table 215 shows the results of the analysis of covariance for course grade for male students in Geometry with Teacher 10. The *F*-value was 5.173 which was statistically significant ($p = 0.046$).

Table 215

Analysis of Covariance Geometry Male Students – Teacher ID 10 - Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	556695.462(a)	2	278347.731	9.540	.005	.656
Intercept	738145.862	1	738145.862	25.299	.001	.717
priorscale	518682.162	1	518682.162	17.777	.002	.640
Section	150933.545	1	150933.545	5.173	.046	.341
Error	291766.538	10	29176.654			
Total	55747787.000	13				
Corrected Total	848462.000	12				

a *R* Squared = .656 (Adjusted *R* Squared = .587)

Table 216

Descriptive Statistics - Geometry Male Students Teacher ID 10

Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2012.25	1966.279	173.572	8
2	2123.40	2196.953	175.209	5

There were 8 male students enrolled in the 8-block schedule Geometry classes and 5 male students enrolled in the traditional 50-minute schedule Geometry classes for Teacher 10. The adjusted mean score for the 8-block scheduled classes was 1966.279 (standard deviation = 173.572) and the adjusted mean score for the traditional 50-minute scheduled classes was 2196.953 (standard deviation = 175.209). These adjusted mean scores are not statistically significant on a Levene's test and the analysis of covariance did produce statistically significant results. In this analysis, based on the Levene's test, there was no significant difference between the variances of the two groups ($p = 0.850$). Therefore, there is no evidence of violation of the assumption of homogeneity of variances. The statistically non-significant result on the Levene's test assures the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the traditional 50-minute schedule earning a higher mean score than students on the 8-block schedule. However the small *n* values for both schedule types should be noted when analyzing the results as they violate another assumption for the analysis of covariance test and call into question the validity of the results.

Eleventh graders' mathematics TAKS test scores vs. schedule type by ethnic subgroup and gender (Pre-Calculus Pre-Advanced Placement students).

Table 217 shows the results of the analysis of covariance for course grade for female students in Pre-Calculus Pre-Advanced Placement with Teacher 21. The *F*-value was 5.387 which was statistically significant ($p = 0.034$).

Table 217

Analysis of Covariance Pre-Calculus Pre-Advanced Placement Female Students – Teacher ID 21

Dependent Variable: TAKS scaled score

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	263251.943(a)	2	131625.971	14.840	.000	.650
Intercept	5367.501	1	5367.501	.605	.448	.036
priorscale	196149.831	1	196149.831	22.115	.000	.580
Section	47776.564	1	47776.564	5.387	.034	.252
Error	141910.584	16	8869.411			
Total	106600771.000	19				
Corrected Total	405162.526	18				

a *R* Squared = .650 (Adjusted *R* Squared = .606)

Table 218

Descriptive Statistics - Pre-Calculus Pre-Advanced Placement Female Students Teacher ID 21 - Dependent Variable: TAKS scaled score

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	2463.60	2448.402	94.454	5
2	2328.64	2334.071	94.275	14

There were 5 female students enrolled in the 8-block schedule Pre-Calculus Pre-Advanced Placement classes and 14 female students enrolled in the traditional 50-minute schedule Pre-Calculus Pre-Advanced Placement classes for Teacher 21. The adjusted mean score for the 8-block scheduled classes was 2448.402 (standard deviation = 94.454) and the adjusted mean score for the traditional 50-minute scheduled classes was 2334.071 (standard deviation = 94.275). The analysis of covariance did produce statistically significant results, although the adjusted mean scores are statistically significant on a Levene's test of equality of error variances, as shown in the Table 219 below. In this analysis the *F*-value was 5.357 and $p = 0.033$.

Table 219

Levene's Test of Equality of Error Variances

Pre-Calculus Pre-Advanced Placement Female Students

Teacher ID 21 - Dependent Variable: TAKS scaled score

F	*df1*	*df2*	Sig.
5.357	1	17	.033

The Levene's test measures homogeneity of the variances and a statistically significant result indicates the differences existed between the means prior to the analysis to the extent that the significance of the results may be caused by the differences that existed previously and not may not be explained by the independent variable alone. A statistically non-significant result on the Levene's test would assure the researcher that the differences in the means of the two groups appear to be explained by the independent variable, with students on the 8-block schedule earning a higher mean score than students on the traditional 50-minute schedule; however, the results should be further analyzed in light of the Levene's result if definitive conclusions are to be made regarding the effect of the schedule type on student performance on the mathematics portion of the Texas Assessment of Knowledge and Skills for this teacher and mathematics class. In addition, the small *n* values should be noted when analyzing the results as they violate another assumption of the analysis of covariance test and call into question the validity of the results.

Research Question 3 Results

Question 3: Is there a statistically significant difference in state developed end-of-course exam scores (EOC) between students taking Algebra I on a traditional 50-minute schedule and students taking Algebra I, from the same teacher, on an 8-block schedule?

Tests of significance were conducted for each of seven teacher's classes in Algebra I to determine the effect of a traditional 50-minute and an 8-block schedule on student performance as measured with the Algebra I end-of-course examination. Student raw scores for the examination for each student were collected and compared for students by teacher and by course. Scaled score data from the 2003-2004 Texas Assessment of Knowledge and Skills mathematics examination for each student was used as a covariate to control for individual academic differences. Of the seven teacher's classes, no results were statistically significant. Table 220 and subsequent analyses in Tables 221 through 234 outline the results of these significance tests. Each teacher of Algebra I is presented in Table 220. A response of "no" in the table indicates that the analysis of covariance conducted on student performance for a particular teacher was not statistically significant and the null hypothesis, that there is no statistically significant difference in student performance on the Algebra I end-of-course based on the schedule type, should not be rejected. A response of "yes" would indicate a result that was statistically significant and that the null hypothesis should be rejected.

Research Question 3 asks, “Is there a statistically significant difference in state developed end-of-course exam scores (EOC) between students taking Algebra I on a traditional 50-minute schedule and those students taking Algebra I, from the same teacher, on an 8-block schedule?” As shown in Table 220, there were no statistically significant differences between the end-of-course exam scores students received on either the traditional 50-minute schedule or the 8-block schedule. Results are shown for seven teachers.

Table 220

Rejection of the Null Hypothesis for the Algebra I End-of-Course based on Analyses of Covariance conducted for Algebra I Course, by Teacher

Teacher ID	End-of-Course Examination
1	No
2	No
3	No
18	No
19	No
24	No
25	No

Table 221 shows the results of the analysis of covariance for Teacher 1. The *F*-value was 2.418, which was not statistically significant (p = 0.136).

Table 221

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 1 - Dependent Variable: End-of-Course exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1410.787(a)	2	705.393	1.313	.291	.116
Intercept	880.455	1	880.455	1.639	.215	.076
’04 scaled score	45.406	1	45.406	.085	.774	.004
Schedule type	1299.384	1	1299.384	2.418	.136	.108
Error	10746.170	20	537.308			
Total	74245.000	23				
Corrected Total	12156.957	22				

a *R* Squared = .116 (Adjusted *R* Squared = .028)

Table 222

Descriptive Statistics - Teacher ID 1 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	59.33	59.192	23.241	12
2	43.91	44.063	23.246	11

There were 12 students enrolled in the 8-block schedule classes and 11 students enrolled in the traditional 50-minute schedule classes for Teacher 1. The adjusted mean score for Teacher 1 for the 8-block scheduled classes was 59.192 (standard deviation =

23.241) and the adjusted mean score for the traditional 50-minute scheduled classes was 44.063 (standard deviation = 23.246). These results are not statistically significant.

Table 223 shows the results of the analysis of covariance for Teacher 2. The *F*-value was 0.045, which was not statistically significant (p = 0.833).

Table 223

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 2 - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	5301.499(a)	2	2650.750	14.253	.000	.289
Intercept	471.664	1	471.664	2.536	.116	.035
’04 scaled score	5160.599	1	5160.599	27.748	.000	.284
Schedule type	8.314	1	8.314	.045	.833	.001
Error	13018.829	70	185.983			
Total	263081.000	73				
Corrected Total	18320.329	72				

a *R* Squared = .289 (Adjusted *R* Squared = .269)

Table 224

Descriptive Statistics - Teacher ID 2 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	59.00	58.172	13.678	45
2	56.14	57.473	13.705	28

There were 45 students enrolled in the 8-block schedule classes and 28 students enrolled in the traditional 50-minute schedule classes for Teacher 2. The adjusted mean score for Teacher 2 for the 8-block scheduled classes was 58.172 (standard deviation = 13.678) and the adjusted mean score for the traditional 50-minute scheduled classes was 57.473 (standard deviation = 13.705). These results are not statistically significant.

Table 225 shows the results of the analysis of covariance for Teacher 3. The *F*-value was 0.868, which was not statistically significant ($p = 0.356$).

Table 225

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 3 - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	4208.592(a)	2	2104.296	9.776	.000	.298
Intercept	220.520	1	220.520	1.025	.317	.022
’04 scaled score	3628.565	1	3628.565	16.858	.000	.268
Schedule type	186.762	1	186.762	.868	.356	.019
Error	9901.244	46	215.244			
Total	236759.000	49				
Corrected Total	14109.837	48				

a *R* Squared = .298 (Adjusted *R* Squared = .268)

Table 226

Descriptive Statistics - Teacher ID 3 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	64.43	65.693	14.763	28
2	71.38	69.695	14.793	21

There were 28 students enrolled in the 8-block schedule classes and 21 students enrolled in the traditional 50-minute schedule classes for Teacher 3. The adjusted mean score for Teacher 3 for the 8-block scheduled classes was 65.693 (standard deviation = 14.763) and the adjusted mean score for the traditional 50-minute scheduled classes was 69.695 (standard deviation = 14.793). These results are not statistically significant.

Table 227 shows the results of the analysis of covariance for Teacher 18. The *F*-value was 0.039, which was not statistically significant (p = 0.844).

Table 227

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 18 - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	11900.871(a)	2	5950.435	32.810	.000	.544
Intercept	1132.895	1	1132.895	6.247	.015	.102
’04 scaled score	10746.930	1	10746.930	59.258	.000	.519
Schedule type	7.087	1	7.087	.039	.844	.001
Error	9974.716	55	181.358			
Total	311986.000	58				
Corrected Total	21875.586	57				

a *R* Squared = .544 (Adjusted *R* Squared = .527)

Table 228

Descriptive Statistics - Teacher ID 18 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	66.11	71.108	13.901	28
2	75.03	70.366	13.868	30

There were 28 students enrolled in the 8-block schedule classes and 30 students enrolled in the traditional 50-minute schedule classes for Teacher 18. The adjusted mean score for Teacher 18 for the 8-block scheduled classes was 71.108 (standard deviation = 13.901) and the adjusted mean score for the traditional 50-minute scheduled

classes was 70.366 (standard deviation = 13.868). These results are not statistically significant.

Table 229 shows the results of the analysis of covariance for Teacher 19. The *F*-value was 0.126, which was not statistically significant ($p = 0.724$).

Table 229

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 19 - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1400.563(a)	2	700.281	2.397	.102	.091
Intercept	437.120	1	437.120	1.496	.227	.030
’04 scaled score	1332.695	1	1332.695	4.562	.038	.087
Schedule type	36.730	1	36.730	.126	.724	.003
Error	14021.476	48	292.114			
Total	256855.000	51				
Corrected Total	15422.039	50				

a *R* Squared = .091 (Adjusted *R* Squared = .053)

Table 230

Descriptive Statistics - Teacher ID 19 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	66.93	67.422	17.114	14
2	69.51	69.327	17.100	37

There were 14 students enrolled in the 8-block schedule classes and 37 students enrolled in the traditional 50-minute schedule classes for Teacher 19. The adjusted mean score for Teacher 19 or the 8-block scheduled classes was 67.422 (standard deviation = 17.114) and the adjusted mean score for the traditional 50-minute scheduled classes was 69.327 (standard deviation = 17.100). These results are not statistically significant.

Table 231 shows the results of the analysis of covariance for Teacher 24. The *F*-value was 0.068, which was not statistically significant ($p = 0.795$).

Table 231

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 24 - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	9103.211(a)	2	4551.605	10.971	.000	.224
Intercept	211.200	1	211.200	.509	.478	.007
’04 scaled score	9100.178	1	9100.178	21.934	.000	.224
Schedule type	28.159	1	28.159	.068	.795	.001
Error	31531.777	76	414.892			
Total	374540.000	79				
Corrected Total	40634.987	78				

a *R* Squared = .224 (Adjusted *R* Squared = .204)

Table 232

Descriptive Statistics - Teacher ID 24 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	64.74	65.843	20.405	27
2	65.15	64.581	20.386	52

There were 27 students enrolled in the 8-block schedule classes and 52 students enrolled in the traditional 50-minute schedule classes for Teacher 24. The adjusted mean score for Teacher 24 or the 8-block scheduled classes was 65.843 (standard deviation = 20.405) and the adjusted mean score for the traditional 50-minute scheduled classes was 64.581 (standard deviation = 20.386). These results are not statistically significant.

Table 233 shows the results of the analysis of covariance for Teacher 25. The *F*-value was 0.347, which was not statistically significant ($p = 0.558$).

Table 233

Analysis of Covariance: Algebra I End-of-Course Performance Teacher ID 25 - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1894.648(a)	2	947.324	1.526	.226	.049
Intercept	987.618	1	987.618	1.590	.212	.026
’04 scaled score	1505.527	1	1505.527	2.424	.125	.039
Schedule type	215.733	1	215.733	.347	.558	.006
Error	36637.820	59	620.980			
Total	279721.000	62				
Corrected Total	38532.468	61				

a *R* Squared = .049 (Adjusted *R* Squared = .017)

Table 234

Descriptive Statistics - Teacher ID 25 - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	59.42	60.158	25.036	26
2	64.50	63.969	25.002	36

There were 26 students enrolled in the 8-block schedule classes and 36 students enrolled in the traditional 50-minute schedule classes for Teacher 25. The adjusted mean score for Teacher 25 for the 8-block scheduled classes was 60.158 (standard deviation = 25.036) and the adjusted mean score for the traditional 50-minute scheduled

classes was 63.969 (standard deviation = 25.002). These results are not statistically significant.

Results on student performance on the Algebra I end-of-course examination were also aggregated for the district and for each campus and analyses of covariance conducted to determine if any effect of the schedule type existed at the campus or district level rather than at the teacher level. Tables 235 through 240 provide the results of these significance tests. Of these three significance tests, no results were statistically significant.

District Level Comparisons: Aggregate Analyses for Algebra I End-of-Course Exam Score vs. Schedule Type

Table 235 shows the results of the analysis of covariance for Algebra I performance on the end-of-course exam for all students in the district. The *F*-value was 2.289, which was not statistically significant (p = 0.131).

Table 235

Analysis of Covariance Algebra I End-of-Course Examination District Level Aggregated Data Comparison - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	34897.578(a)	2	17448.789	50.661	.000	.194
Intercept	588.456	1	588.456	1.709	.192	.004
’04 scaled score	33051.385	1	33051.385	95.961	.000	.185
Schedule type	788.442	1	788.442	2.289	.131	.005
Error	145346.742	422	344.424			
Total	1923221.000	425				
Corrected Total	180244.320	424				

a *R* Squared = .194 (Adjusted *R* Squared = .190)

Table 236

Descriptive Statistics - Algebra I End-of-Course District Level - Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	61.68	62.491	18.589	186
2	65.88	65.246	18.582	239

There were 186 students enrolled in the 8-block schedule classes and 239 students enrolled in the traditional 50-minute schedule classes for Algebra I at the district level. The adjusted mean score for the district on the 8-block scheduled classes was 62.491 (standard deviation = 18.589) and the adjusted mean score for the traditional 50-minute scheduled classes was 65.246 (standard deviation = 18.582). These results are not statistically significant.

Table 237 shows the results of the analysis of covariance for Algebra I performance on the end-of-course exam for all students at McKinney High School. The *F*-value was 1.865, which was not statistically significant ($p = 0.174$).

Table 237

Analysis of Covariance Algebra I End-of-Course Examination McKinney High School Aggregated Data Comparison - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	12600.446(a)	2	6300.223	24.029	.000	.218
Intercept	1189.069	1	1189.069	4.535	.035	.026
’04 scaled score	12256.559	1	12256.559	46.746	.000	.214
Schedule type	489.000	1	489.000	1.865	.174	.011
Error	45097.932	172	262.197			
Total	700119.000	175				
Corrected Total	57698.377	174				

a *R* Squared = .218 (Adjusted *R* Squared = .209)

Table 238

Descriptive Statistics - Algebra I End-of-Course – McKinney High School Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	59.24	58.982	16.198	91
2	62.05	62.329	16.195	84

There were 91 students enrolled in the 8-block schedule classes and 84 students enrolled in the traditional 50-minute schedule classes for Algebra I at McKinney High School. The adjusted mean score for this campus on the 8-block scheduled classes was 58.982 (standard deviation = 16.198) and the adjusted mean score for the traditional 50-minute scheduled classes was 62.329 (standard deviation = 16.195). These results are not statistically significant.

Table 239 shows the results of the analysis of covariance for Algebra I performance on the end-of-course exam for all students at McKinney North High School. The *F*-value was 0.161, which was not statistically significant (p = 0.689).

Table 239

Analysis of Covariance Algebra I End-of-Course Examination McKinney North High School Aggregated Data Comparison - Dependent Variable: End-of-Course Exam

Source	Type III Sum of Squares	*df*	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	20781.010(a)	2	10390.505	26.129	.000	.175
Intercept	.562	1	.562	.001	.970	.000
’04 scaled score	19864.667	1	19864.667	49.954	.000	.168
Schedule type	63.884	1	63.884	.161	.689	.001
Error	98221.006	247	397.656			
Total	1223102.000	250				
Corrected Total	119002.016	249				

a R Squared = .175 (Adjusted R Squared = .168)

Table 240

Descriptive Statistics - Algebra I End-of-Course McKinney North High School

Dependent Variable: End-of-Course Exam

Section	Mean	Adjusted Means	Std. Deviation of Adjusted Means	*n*
1	64.01	65.802	20.098	95
2	67.95	66.857	20.032	155

There were 95 students enrolled in the 8-block schedule classes and 155 students enrolled in the traditional 50-minute schedule classes for Algebra I at McKinney North High School. The adjusted mean score for this campus on the 8-block scheduled classes was 65.802 (standard deviation = 20.098) and the adjusted mean score for the traditional 50-minute scheduled classes was 66.857 (standard deviation = 20.032). These results are not statistically significant.

Research Question 4 Results

Question 4: Is there a difference in teacher perception between the 8-block schedule and the traditional schedule?

a. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of student academic success?
b. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of teacher satisfaction?
c. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of teacher retention?

d. Is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of fulfillment of curricular purpose?

Surveys of teacher perceptions regarding the effects of a traditional 50-minute and an 8-block schedule on student achievement were sent to each research study participant teacher at McKinney High School and McKinney North High School. The survey teachers were sent is included in Appendix D. Complete responses are presented in Appendix E. Thirty-one surveys were sent to teachers. Fourteen surveys were returned to the researcher. The return rate for the participant teachers is 45%.

Teachers were asked to respond to three questions. The questions attempted to gain understanding about teacher perception of student performance, overall teacher satisfaction, and the ability to accomplish curricular goals on a traditional 50-minute and an 8-block schedule. Table 241 attempts to summarize the responses of the teachers to the three survey questions. Teacher respondents were also given space to record any additional comments regarding the two scheduling types. Those individual responses are available in Appendix E.

Table 241

Summary of Teacher Survey Responses, by Question

	Question 1: Opinions regarding the effects of the two scheduling types on student achievement	Question 2: Opinions regarding the effects of the two scheduling types on teacher satisfaction and retention	Question 3: Opinions regarding the effects of the two scheduling types on the accomplishment of curricular goals.
Responses on Effects of Traditional Schedule	• 10 of 14 responded favorably to traditional scheduling • Presenting smaller amounts of information is easier to retain • Meeting daily helps students keep up with homework and improve class performance • There is an increased amount of class time available for learning • Meeting daily helps with retention of information • Make up work is easier – students only miss one class and can catch up • Fewer discipline problems and greater class time efficiency	• 6 of 14 responded favorably to traditional scheduling • Can slow down and feel kids do better when they meet everyday • Feel they can accomplish more • Feel better prepared for class, more organized and structured • Kids behave better because they can focus better in the shorter classes leading to fewer discipline issues • There is little time in class to get to the hands-on activities or to complete them in one class meeting	• 8 of 14 responded favorably to traditional scheduling • More time means it is easier to meet all the curriculum objectives • There are fewer opportunities to forget material meeting daily – improved retention helps with vertical curriculum issues • More time over the course of the year means classes can slow down and have re-teach opportunities and still meet all the goals • It is easier when there is an assembly or a class is missed to catch up and stay on the curriculum plan

(*table continues*)

Table 241 (*continued*).

	Question 1: Opinions regarding the effects of the two scheduling types on student achievement	Question 2: Opinions regarding the effects of the two scheduling types on teacher satisfaction and retention	Question 3: Opinions regarding the effects of the two scheduling types on the accomplishment of curricular goals.
Responses on Effects of Block Schedule	• 2 of 14 responded favorably to block scheduling • The pace is faster and more work can be done in each class meeting • The teacher can supplement the lesson with more hands-on activities and make better connections for learning • There is too much information to be presented in one class – like teaching two days for every one • When students are absent they miss twice as much information and are less likely to catch it up • Students forget material and are less likely to keep up with homework	• 2 of 14 responded favorably to block scheduling • Teachers can get to know their students better given longer class periods • Classes are longer giving time to go back over material instead of moving on when students didn't "get it" • There is more time to do the activities and projects that are enjoyable, and to complete tests and assignments • It is difficult to keep up with the classes on the two different days, especially if they get off schedule from each other	• 1 of 14 responded favorably to block scheduling • Teachers can better integrate the required activities and technology projects without feeling rushed • Since each class meets on alternating days, too much information must be covered each class making it hard to feel effective • Students forget materials over the alternate day off and time gets lost re-teaching what they forgot rather than being able to finish the curriculum objectives

(*table continues*)

Table 241 (*continued*).

	Question 1: Opinions regarding the effects of the two scheduling types on student achievement	Question 2: Opinions regarding the effects of the two scheduling types on teacher satisfaction and retention	Question 3: Opinions regarding the effects of the two scheduling types on the accomplishment of curricular goals.
Other responses	• 3 of 14 provided a more neutral response • The combination of the two different scheduling methods at the same time makes it difficult for the students to prioritize their classes and their outside work	• 6 of 14 provided a more neutral response • The district should choose one or the other of the two different scheduling methods and not keep trying to do them both at once • It is difficult for teachers to prepare to teach on two different scheduling methods at the same time which leads to fatigue • Teachers want to keep the sections together on the same plan as much as possible. This is hard with the two scheduling methods at once • With having two different methods running at once, some teachers got	• 5 of 14 provided a more neutral response • Teachers can meet the curriculum goals on both schedules but it is difficult on teachers to try and do them both at once • With the way the schedules were conducted, there was not a common planning opportunity for teachers of the same discipline – this would have made it easier to plan together and ensure all the objectives were being met

(*table continues*)

Table 241 (*continued*).

	Question 1: Opinions regarding the effects of the two scheduling types on student achievement	Question 2: Opinions regarding the effects of the two scheduling types on teacher satisfaction and retention	Question 3: Opinions regarding the effects of the two scheduling types on the accomplishment of curricular goals.
		conference periods on a long block period and others got a short off period leading to a sense of unfairness	

CHAPTER 5

CONCLUSIONS, SUMMARY, AND RECOMMENDATIONS

Conclusions

This study was designed to determine the effects of two different schedule types, traditional 50-minute and 8-block classes, on mathematics achievement for public high school students. The instruments used included the Texas Assessment of Knowledge and Skills, given annually to all students in grades 3 through 11, the Texas Algebra I end-of-course Assessment, given to Algebra I students in participating districts, and student final course grades as determined by classroom teachers. The study compared students' performance in these three areas during the 2004-2005 academic year in one suburban school district in Texas. The study utilized classes in which the teacher instructs the same course on both a traditional 50-minute and 8-block time schedule concurrently. This study also investigated a qualitative aspect by including an opinion survey of teachers' perceptions regarding student mathematics academic performance, teacher satisfaction and retention, and the ability to accomplish curricular goals.

Included in the research study were students and teachers at two large 4-A high schools in North Texas. Thirty-one of the 37 mathematics teachers employed at both high schools were involved, along with students who took mathematics courses with these instructors. The data investigated included student academic performance in terms of course grades, performance in terms of a statewide administered standardized test in mathematics, and a state developed end-of-course assessment in Algebra I. The mathematics courses in which students were enrolled for the research included Algebra

I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement. In each case, students were either enrolled in the mathematics course on a daily meeting, traditional 50-minute schedule, or an alternating day, 8-block schedule. In total, 1,814 students were included in analyses for the research.

The information that follows includes a review of the results of statistical analyses conducted for each research question and any conclusions that can be drawn, considerations for the limitations of the research study, the contributions of the research to the body of knowledge on the subject matter, implications of the research to educational practice, and recommendations for future research.

Conclusions and Discussion: Research Question 1

Introduction to Conclusion and Discussion for Research Question 1

In this section the conclusions and discussion for research Question 1, a through k, will be reviewed. Research Question 1 relates to student performance in terms of course grades in mathematics courses between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule.

Conclusion and Discussion for Research Question 1.a.

Research Question 1.a. states, is there a statistically significant difference for course grades between students taking Algebra I on a traditional 50 minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Seven teachers of Algebra I across two high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using an analysis of covariance statistical procedure. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra I course. A total of 430 students were included in the seven analyses conducted. As shown in Table 7, there were no analyses of covariance that produced statistically significant results for course grades based on the schedule type, leading to the assumption that the independent variable, schedule type, had no effect on student performance on course grades for students enrolled in Algebra I.

Conclusion and Discussion for Research Question 1.b.

Research Question 1.b. states, is there a statistically significant difference for course grades between students taking Algebra II on a traditional 50-minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Five teachers of Algebra II across both high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra II course. A total of 271 students were included in the five analyses conducted. As shown in Table 22, there was one analysis of covariance that produced statistically significant results for course grades based on the schedule type. This result was generated by Teacher 27 and generated an F-value of 4.636, which was statistically significant with a p equal to 0.035, at the 0.05 alpha-level. In this case, students in the 8-block scheduled classes performed higher on the variable of course grade than students on the traditional 50-minute schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, it is assumed that the independent variable, schedule type, had an effect on students' performance on their course grade in Algebra II.

Conclusions and Discussion for Research Question 1.c.

Research Question 1.c. states, is there a statistically significant difference for course grades between students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Five teachers of Algebra II Pre-Advanced Placement across both high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra II Pre-Advanced Placement course. A total of 226 students were included in the five analyses conducted. As shown in Table 34, there was one analysis of covariance that produced statistically significant results for course grades based on the schedule type. This result was generated by Teacher 30 and generated an F-value of 5.073, which was statistically significant with a p equal to 0.029, at the 0.05 alpha-level. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, it is assumed that the independent variable, schedule type, had an effect on students' performance on their course grade in Algebra II Pre-Advanced Placement.

Conclusions and Discussion for Research Question 1.d.

Research Question 1.d. states, is there a statistically significant difference for course grades between students taking Algebra III on a traditional 50 minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Two teachers of Algebra III across both high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra III course. A total of 92 students were included in the two analyses conducted. As shown in Table 45, there were no analyses of covariance that produced statistically significant results for course grades based on the schedule type, leading to the assumption that the independent variable, schedule type, had no effect on student performance on course grades for students enrolled in Algebra III.

Conclusions and Discussion for Research Question 1.e.

Research Question 1.e. states, is there a statistically significant difference for course grades between students taking Geometry on a traditional 50 minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Seven teachers of Geometry across both high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Geometry course. A total of 402 students were included in the seven analyses conducted. As shown in Table 50, there were no analyses of covariance that produced statistically significant results for course grades based on the schedule type, leading to the assumption that the independent variable, schedule type, had no effect on student performance on course grades for students enrolled in Geometry.

Conclusions and Discussion for Research Question 1.f.

Research Question 1.f. states, is there a statistically significant difference for course grades between students taking Geometry Pre-Advanced Placement on a traditional 50 minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Two teachers of Geometry Pre-Advanced Placement across both high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Geometry Pre-Advanced Placement course. A total of 214 students were included in the two analyses conducted. As shown in Table 65, there were no analyses of covariance that produced statistically significant results for course grades based on the schedule type, leading to the assumption that the independent variable, schedule type, had no effect on student performance on course grades for students enrolled in Geometry Pre-Advanced Placement.

Conclusions and Discussion for Research Question 1.g.

Research Question 1.g. states, is there a statistically significant difference for course grades between students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule, and students taking the same course, from the same teacher, on an 8-block schedule?

Three teachers of Pre-Calculus Pre-Advanced Placement across both high school campuses used in the research study taught students on both types of schedules. Students' final course grades were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Pre-Calculus Pre-Advanced Placement course. A total of 161 students were included in the three analyses conducted. As shown in Table 70, there was one analyses of covariance that produced statistically significant results for course grades based on the schedule type. This result was generated by Teacher 13 and generated an *F*-value of 10.180, which was statistically significant with a *p* equal to 0.002, at the 0.05 alpha-level. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. However, the results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on student performance on their course grade in the class, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students.

Conclusions and Discussion for Research Question 1.h.

Research Question 1.h. states, is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule, when the data is analyzed at the district level?

Results on the performance of students' on final course grades in mathematics courses were analyzed at a district level. Students in the same course, regardless of teacher, were aggregated into one sample and analyses of covariance were conducted for each mathematics course to investigate if any effects of the independent variable, schedule type, existed at the district level. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. The data were analyzed by course for Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement. Tables 78 through 92 highlighted the results of the analyses conducted. Of the seven mathematics courses, one analysis of covariance produced statistically significant results for course grades based on the schedule type. This result was generated for Pre-Calculus Pre-Advanced Placement and generated an *F*-value of 4.545, which was statistically significant with a *p* equal to 0.035, at the 0.05 alpha-level. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, it is assumed that the independent variable, schedule type, had an effect on students' performance on their course grade in Pre-Calculus Pre-Advanced Placement.

Conclusions and Discussion for Research Question 1.i.

Research Question 1.i. states, is there a statistically significant difference for course grades between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule when the data is analyzed at the campus level?

Results on the performance of students' on final course grades in mathematics courses were analyzed at a campus level. Students in the same course at the same campus, regardless of teacher, were aggregated into one sample and analyses of covariance were conducted for each mathematics course to investigate if any effects of the independent variable, schedule type, existed at the campus level. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. The data were analyzed by course for Algebra I, Algebra II, Algebra II Pre-Advanced Placement, Algebra III, Geometry, Geometry Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement for each of the two campuses. Of the fourteen tests of significance that were conducted for the campus level, two returned results that are considered statistically significant for course grades based on the schedule type.

The first statistically significant result was generated for Algebra II at McKinney High School and produced an *F*-value of 6.006, which was statistically significant with a *p* equal to 0.016, at the 0.05 alpha-level, as seen in Table 93. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, it is assumed that the independent variable, schedule type, had an effect on students' performance on their course grade in Algebra II at McKinney High School.

The second statistically significant result was generated for Pre-Calculus Pre-Advanced Placement at McKinney High School and produced an *F*-value of 10.180, which was statistically significant with a *p* equal to 0.002, at the 0.05 alpha-level, as seen in Table 95. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. However, the results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on students' performance on their course grade in Pre-Calculus Pre-Advanced Placement at McKinney High School, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students.

Conclusions and Discussion for Research Question 1.j.

Research Question 1.j. states, is there a statistically significant difference for course grades between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Students' final course grades were compared by ethnic group, White, Black, and Hispanic, for each teacher and each course according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. Three analyses were conducted for each of 31 teachers to investigate if the course grades of particular ethnic groups of students may have been impacted by the schedule type. As shown in Table 98, three of the 93 analyses produced a statistically significant result for course grades based on the schedule type.

The first statistically significant result was generated for Hispanic students in Algebra II under instruction from Teacher 27. The significance test produced an *F*-value of 17.914, which was statistically significant with a *p* equal to 0.001, at the 0.05 alpha-level, as seen in Table 104. In this case, students in the 8-block scheduled classes performed higher on the variable of course grade than students on the traditional 50-minute schedule. The test results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on Hispanic students' performance on their course grade in Teacher 27's Algebra II course, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students. In addition to the Levene's data, this particular group also had a very small sample size. For the 8-block scheduled Algebra II classes with Teacher 27, there were 11 Hispanic students, and for the traditional 50-minute classes there were three Hispanic students enrolled. These very low sample sizes violate assumptions about analysis of covariance testing and, therefore, it is difficult to form any conclusions about the effects of the schedule type on the student's performance in their grades. It could be that the independent variable had some effect, but given the small size of the sample, it is likely that the results are not valid and no definitive conclusion can be drawn from this data.

The second statistically significant result was generated for Black students in Algebra II under instruction from Teacher 28. The significance test produced an *F*-value of 11.792, which was statistically significant with a *p* equal to 0.019, at the 0.05 alpha-level, as seen in Table 111. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. While these results were not statistically significant on a Levene's analysis of equality of variances, leading one to interpret that the independent variable, schedule type, had an effect on Black students' performance on their course grade in Teacher 28's Algebra II course, this particular group also had a very small sample size. For the 8-block scheduled Algebra II classes with Teacher 28 there were three Black students, and for the traditional 50-minute classes there were five Black students enrolled. These very low sample sizes violate assumptions about analysis of covariance testing and, therefore, it is difficult to form any conclusions about the effects of the schedule type on the student's performance in their grades. It could be that the independent variable had some effect, but given the small size of the sample, it is likely that the results are not valid and no definitive conclusion can be drawn from this data.

The third statistically significant result was generated for White students in Pre-Calculus Pre-Advanced Placement under instruction from Teacher 13. The significance test produced an *F*-value of 8.022, which was statistically significant with a *p* equal to 0.007, at the 0.05 alpha-level, as seen in Table 117. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, it is assumed that the independent variable, schedule type, had an effect on White students' performance on their course grade in Pre-Calculus Pre-Advanced Placement under instruction from Teacher 13. In this situation, the sample size of 50-one students is large enough to form this conclusion.

Conclusions and Discussion for Research Question 1.k.

Research Question 1.k. states, is there a statistically significant difference for course grades between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Students' final course grades were compared by gender group, male and female, for each teacher and each course according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. Two analyses were conducted for each of 31 teachers to investigate if the course grades of particular gender groups of students may have been impacted by the schedule type. As shown in Table 98, six of the 62 analyses produced a statistically significant result for course grades based on the schedule type.

The first statistically significant result was generated for female students in Algebra I under instruction from Teacher 1. The significance test produced an *F*-value of 4.337, which was statistically significant with a *p* equal to 0.050, at the 0.05 alpha-level, as seen in Table 99. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, it is assumed that the independent variable, schedule type, had an effect on female students' performance on their course grade in Algebra I under instruction from Teacher 1.

The second statistically significant result was generated for male students in Algebra II under instruction from Teacher 27. The significance test produced an *F*-value of 6.443, which was statistically significant with a p equal to 0.018 at the 0.05 alpha-level, as seen in Table 101. In this case, students in the 8-block scheduled classes performed higher on the variable of course grade than students on the traditional 50-minute schedule. The test results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on male students' performance on their course grade in Teacher 27's Algebra II course, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students. In addition to the Levene's data, this particular group also had a very small sample size for the traditional 50-minute schedule. For the 8-block scheduled Algebra II classes with Teacher 27, there were 21 male students, and for the traditional 50-minute classes there were 7 male students enrolled. The discrepancies between these sample sizes may violate assumptions about analysis of covariance testing and, therefore, it is difficult to form any conclusions about the effects of the schedule type on the student's performance in their grades. It could be that the independent variable had some effect, but given the small size of the sample, it is likely that the results are not valid and no definitive conclusion can be drawn from this data.

The third statistically significant result was generated for male students in Algebra II under instruction from Teacher 28. The significance test produced an *F*-value of 6.776, which was statistically significant with a *p* equal to 0.015 at the 0.05 alpha-level, as seen in Table 107. In this case, students in the 8-block scheduled classes performed higher on the variable of course grade than students on the traditional 50-minute schedule. Since the results were not statistically significant on a Levene’s analysis of equality of variances, and the samples were of adequate size, it is assumed that the independent variable, schedule type, had an effect on male students’ performance on their course grade in Algebra II for Teacher 28. In this situation, the sample size of 30 students is large enough to form this conclusion.

The fourth statistically significant result was generated for female students in Algebra II under instruction from Teacher 28. The significance test produced an *F*-value of 6.560, which was statistically significant with a *p* equal to 0.014 at the 0.05 alpha-level, as seen in Table 109. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene’s analysis of equality of variances, and the samples were of adequate size, it is assumed that the independent variable, schedule type, had an effect on female students’ performance on their course grade in Algebra II for Teacher 28. In this situation, the sample size of 43 students is large enough to form this conclusion.

The fifth statistically significant result was generated for male students in Geometry Pre-Advanced Placement under instruction from Teacher 15. The significance test produced an *F*-value of 7.475, which was statistically significant with a *p* equal to 0.011 at the 0.05 alpha-level, as seen in Table 113. In this case, students in the 8-block scheduled classes performed higher on the variable of course grade than students on the traditional 50-minute schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, and the samples were of adequate size, it is assumed that the independent variable, schedule type, had an effect on male students' performance on their course grade in Geometry Pre-Advanced Placement for Teacher 30. In this situation, the sample size of 28 students is large enough to form this conclusion.

The sixth statistically significant result was generated for female students in Pre-Calculus Pre-Advanced Placement under instruction from Teacher 13. The significance test produced an *F*-value of 8.097, which was statistically significant with a *p* equal to 0.008 at the 0.05 alpha-level, as seen in Table 115. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of course grade than students on the 8-block schedule. Since the results were not statistically significant on a Levene's analysis of equality of variances, and the samples were of adequate size, it is assumed that the independent variable, schedule type, had an effect on female students' performance on their course grade in Pre-Calculus Pre-Advanced Placement for Teacher 13. In this situation, the sample size of 36 students is large enough to form this conclusion.

Summary of Conclusions and Discussion for Research Question 1

In terms of academic performance for students in their course grades, teacher perception at the beginning of the academic year and throughout the school year was that students in their traditional classes meeting daily for 50-minutes each performed better in class and receive higher grades than their peers in the 8-block classes that met on alternating days for 90 minutes. When the data were compared by use of analyses of covariance tests of significance the results were conclusive. Three of the 31 teacher level tests conducted based on mathematics course resulted in a rejection of the null hypothesis, that schedule type does not have a statistically significant effect on student performance on their final course grades, at the 0.05 alpha level and indicated that schedule type had some affect on student grades in certain teacher's classes. When these three sections were compared individually using analysis of mean scores, two of the three sections showed a higher mean for traditionally scheduled classes than for block. However, one of these tests also resulted in questionable data given a statistically significant finding on a Levene's analysis. If the statistical significance on the Pre-Calculus Pre-Advanced Placement classes for Teacher 13 were disregarded due to the Levene's analysis, then the results of the other two tests are inconsistent, with one favoring the 8-block schedule and the other favoring the traditional 50-minute schedule.

Taken as a whole, three class sections with a statistically significant result out of 31 do not support the conclusion that schedule type has a great influence on student course grades. However, the three significant tests all occurred in advanced level mathematics courses, Algebra II, Algebra II Pre-Advanced Placement, and Pre-Calculus Pre-Advanced Placement. Results of this type may be of interest to local school administrators when determining schedules for future academic years and making decisions regarding the types of schedules that seem to work best for students in terms of course grades. While teacher quality or quality of classroom instruction was not included as part of this research, the school district included in this research study may find it valuable to investigate the role of the teacher as a variable in student performance, as opposed to the schedule type, as the results could be as much a factor of teacher instruction as the schedule type is on student academic performance. This could be accomplished using criteria such as that proposed by Larry Lezotte and included in the effective schools movement.

Student performance was also compared using analyses of covariance tests of significance at a district and campus aggregated data level. These tests were conducted to examine any affects of the independent variable of schedule type on student performance on final course grades by mathematics course for each campus and by mathematics course for the district level. One district level test provided a statistically significant result, in the subject of Pre-Calculus. Two campus level tests also produced statistically significant results for final course grade, one for Pre-Calculus at McKinney High School and one for Algebra II at McKinney Highs School. In all three instances the mean score for the traditionally scheduled classes was higher than that of students in the 8-block schedule. The Pre-Calculus Pre-Advanced Placement class data at McKinney High School also resulted in a statistically significant Levene's test. Given that this result is problematic, it should be disregarded, and then both the district level Pre-Calculus Pre-Advanced Placement course and the campus level Algebra II course produced data that appears to favor the traditional 50-minute schedule.

Results for student performance on final course grades were compared using analyses of covariance for each ethnic subgroup. This data was generated for each teacher in the study and presented by course. A total of 93 analyses of covariance were conducted to determine any possible effects of the independent variable of schedule type on the performance of students on their course grades by ethnic group population. Three of the 93 significance tests generated a statistically significant result; however, one of these tests also resulted in a statistically significant Levene's test. In addition, two of the samples had such small numbers that interpretation of statistical significance is invalid. The remaining sample, a comparison of White students in a Pre-Calculus Pre-Advanced Placement course, produced a statistically significant result that favored the traditional 50-minute schedule.

Results for student performance on final course grades were also compared using analyses of covariance for each gender subgroup. This data was generated for each teacher in the study and presented by course. A total of 62 analyses of covariance were conducted to determine any possible effects of the independent variable of schedule type on the performance of students on their course grades by gender group population. Six of the 62 significance tests generated a statistically significant result; however, one of these tests also resulted in a statistically significant Levene's test and also consisted of a low sample size resulting in possible invalid results when interpreting the statistical significance. Of the remaining five analyses returning a statistically significant result, three favored the traditional 50-minute schedule and two favored the 8-block schedule. This inconsistency makes the determination of a causal relationship toward a particular schedule type impossible.

The only conclusion that can be made based on the analysis of these results is that there is no clear effect of the independent variable, schedule type, on the performance of students by gender or by ethnic group. In some instances significant results were determined; however, no pattern to these results is apparent and there are not enough statistically significant results to support any other conclusion. In addition, the low numbers of students in the subgroups where a statistically significant result occurred make it impossible to determine any true effect of the schedule type on student academic performance since the results are invalidated by the small sample sizes.

Conclusions and Discussion: Research Question 2

Introduction to Conclusion and Discussion for Research Question 2

In this section the conclusions and discussion for research Question 2, a through l, will be reviewed. Research Question 2 relates to student performance in terms of scaled score on the Texas Assessment of Knowledge and Skills mathematics test between students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule.

Conclusions and Discussion for Research Question 2.a.

Research Question 2.a. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Algebra I on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Seven teachers of 9th grade Algebra I across both high school campuses used in the research study taught students on both types of schedules. Students' scaled scores on the 9th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra I course. A total of 430 students were included in the seven analyses conducted. As shown in Table 120, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for 9th grade students enrolled in Algebra I.

Conclusions and Discussion for Research Question 2.b.

Research Question 2.b. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking Algebra II on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Five teachers of 11th grade Algebra II across both high school campuses used in the research study taught students on both types of schedules. Students' scaled scores on the exit-level 11th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra II course. A total of 271 students were included in the five analyses conducted. As shown in Table 135, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for exit-level 11th grade students enrolled in Algebra II.

Conclusions and Discussion for Research Question 2.c.

Research Question 2.c. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Algebra II Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Five teachers of 10th grade Algebra II Pre-Advanced Placement across both high school campuses used in the research study taught students on both types of schedules. Students’ scaled scores on the 10th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra II Pre-Advanced Placement course. A total of 226 students were included in the five analyses conducted. As shown in Table 146, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for 10th grade students enrolled in Algebra II Pre-Advanced Placement.

Conclusions and Discussion for Research Question 2.d.

Research Question 2.d. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking Algebra III on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Two teachers of 11th grade Algebra III across both high school campuses used in the research study taught students on both types of schedules. Students' scaled scores on the exit-level 11th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Algebra III course. A total of 92 students were included in the two analyses conducted. As shown in Table 157, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for exit-level 11th grade students enrolled in Algebra III.

Conclusions and Discussion for Research Question 2.e.

Research Question 2.e. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking Geometry on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Seven teachers of 10th grade Geometry across both high school campuses used in the research study taught students on both types of schedules. Students' scaled scores on the 10th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Geometry course. A total of 402 students were included in the two analyses conducted. As shown in Table 162, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for 10th grade students enrolled in Geometry.

Conclusions and Discussion for Research Question 2.f.

Research Question 2.f. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking Geometry Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Two teachers of 9th grade Geometry Pre-Advanced Placement across both high school campuses used in the research study taught students on both types of schedules. Students' scaled scores on the 9th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Geometry Pre-Advanced Placement course. A total of 214 students were included in the two analyses conducted. As shown in Table 177, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for 9th grade students enrolled in Geometry Pre-Advanced Placement.

Conclusions and Discussion for Research Question 2.g.

Research Question 2.g. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics

(Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking Pre-Calculus Pre-Advanced Placement on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Three teachers of 11th grade Pre-Calculus Pre-Advanced Placement across both high school campuses used in the research study taught students on both types of schedules. Students' scaled scores on the exit-level 11th grade Texas Assessment of Knowledge and Skills mathematics portion were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their Pre-Calculus Pre-Advanced Placement course. A total of 161 students were included in the three analyses conducted. As shown in Table 182, there were no analyses of covariance that produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for exit-level 11th grade students enrolled in Pre-Calculus Pre-Advanced Placement.

Conclusions and Discussion for Research Question 2.h.

Research Question 2.h. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 9th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule?

Ninth grade students included in this research were enrolled in either Algebra I or Geometry Pre-Advanced Placement mathematics courses. In order to answer research Question 2.h. analyses of covariance were conducted for district level aggregated data for each course, regardless of teacher. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics portion was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. The data were analyzed by course, either Algebra I or Geometry Pre-Advanced Placement, and Tables 189 and 199 highlight the results. Neither of these two analyses produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for 9th grade students.

Conclusions and Discussion for Research Question 2.i.

Research Question 2.i. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between 10th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule?

Tenth grade students included in this research were enrolled in either Algebra II Pre-Advanced Placement or Geometry mathematics courses. In order to answer research Question 2.i. analyses of covariance were conducted for district level aggregated data for each course, regardless of teacher. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics portion was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. The data were analyzed by course, either Algebra II Pre-Advanced Placement or Geometry, and Tables 193 and 197 highlight the results. Neither of these two analyses produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for 10th grade students.

Conclusions and Discussion for Research Question 2.j.

Research Question 2.j. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between exit-level 11th grade students taking mathematics courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule?

Eleventh grade students included in this research were enrolled in either Algebra II, Algebra III, or Pre-Calculus Pre-Advanced Placement mathematics courses. In order to answer research Question 2.j. analyses of covariance were conducted for district level aggregated data for each course, regardless of teacher. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics portion was used as a covariate to control for any differences that existed between the two groups of students prior to instruction in their mathematics course. The data were analyzed by course, either Algebra II, Algebra III, or Pre-Calculus Pre-Advanced Placement, and

Tables 191, 195, and 201 highlight the results. None of these three analyses produced statistically significant results for performance on the Texas Assessment of Knowledge and Skills based on schedule type. This leads to the assumption that the independent variable, schedule type, had no effect on student performance on the Texas Assessment of Knowledge and Skills for exit-level 11th grade students.

Conclusions and Discussion for Research Question 2.k.

Research Question 2.k. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between ethnic groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Student performance on the Texas Assessment of Knowledge and Skills mathematics portion were compared by ethnic group, Black, White, and Hispanic, for each teacher and each course according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups prior to instruction in their mathematics course. Three analyses for each of 31 teachers were conducted to investigate if the scaled score on the Texas Assessment of Knowledge and Skills mathematics portion of particular ethnic groups of students may have been impacted by the schedule type. Table 203 illustrates that one analysis produced a statistically significant result for performance on the Texas Assessment of Knowledge and Skills mathematics portion based on the schedule type.

The statistically significant result in these 93 analyses was generated for Hispanic students in Algebra I under instruction from Teacher 24. The significance test produced an *F*-value of 5.687, which was statistically significant with a *p* equal to 0.031, at the 0.05 alpha-level, as seen in Table 209. In this case, students in the traditional 50-minute classes performed higher on the variable of scaled score on the Texas Assessment of Knowledge and Skills mathematics portion than students on the 8-block schedule. The test results were also statistically significant on a Levene’s analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that that independent variable, schedule type, had an effect on Hispanic students’ performance on the Texas Assessment of Knowledge and Skills mathematics test in Teacher 24’s Algebra I course, it may be that case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of students. In addition to the Levene’s data, the sample size in this particular group is also problematic. For the 8-block scheduled Algebra I classes with Teacher 24 there were four Hispanic students, and for the traditional 50-minute classes there were fourteen Hispanic students. The very low sample size for the 8-block scheduled classes violates assumptions about analysis of covariance testing and, therefore, it is difficult to form any conclusions about the effects of the schedule type on the performance of these students. It is likely the data are invalid and no definitive conclusions can be drawn from this data.

Conclusions and Discussion for Research Question 2.l.

Research Question 2.l. states, is there a statistically significant difference in statewide administered criterion referenced standardized test scores of mathematics (Texas Assessment of Knowledge and Skills) between gender groups of students taking mathematics courses on a traditional 50-minute schedule and students taking the same course, from the same teacher, on an 8-block schedule?

Student performance on the Texas Assessment of Knowledge and Skills mathematics portion were compared by gender group, male and female, for each teacher and each course according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test was used as a covariate to control for any differences that existed between the two groups prior to instruction in their mathematics course. Two analyses for each of 31 teachers were conducted to investigate if the scaled score on the Texas Assessment of Knowledge and Skills mathematics portion of particular gender groups of students may have been impacted by the schedule type. Table 203 illustrates that five analyses produced a statistically significant result for performance on the Texas Assessment of Knowledge and Skills mathematics portion based on the schedule type.

The first statistically significant result in these 62 analyses was generated for female students in Algebra I under instruction from Teacher 18. The significance test produced an *F*-value of 4.260, which was statistically significant with a *p* equal to 0.048, at the 0.05 alpha-level, as seen in Table 204. In this case, students in the 8-block classes performed higher on the variable of scaled score on the Texas Assessment of Knowledge and Skills mathematics portion than students on the traditional 50-minute schedule. The test results were not statistically significant on a Levene's analysis of equality of variances, leading one to interpret that the independent variable, schedule type, had an effect on female students' performance on the Texas Assessment of Knowledge and Skills mathematics test in Teacher 18's Algebra I course. In this situation, the sample size of 31 students is large enough to form this conclusion.

The second statistically significant result was generated for male students in Algebra I under instruction from Teacher 24. The significance test produced an *F*-value of 5.106, which was statistically significant with a p equal to 0.031, at the 0.05 alpha-level, as seen in Table 206. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of scaled score on the Texas Assessment of Knowledge and Skills mathematics portion than students on the 8-block schedule. The test results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on male students' performance on their performance on the Texas Assessment of Knowledge and Skills mathematics test in Teacher 24's Algebra I course, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students.

The third statistically significant result was generated for male students in Algebra II under instruction from Teacher 7. The significance test produced an *F*-value of 4.746, which was statistically significant with a p equal to 0.042, at the 0.05 alpha-level, as seen in Table 212. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of scaled score on the Texas Assessment of Knowledge and Skills mathematics portion than students on the 8-block schedule. The test results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on male students' performance on their performance on the Texas Assessment of Knowledge and Skills mathematics test in Teacher 7's Algebra II course, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students.

The fourth statistically significant result was generated for male students in Geometry under instruction from Teacher 10. The significance test produced an *F*-value of 5.173, which was statistically significant with a *p* equal to 0.046, at the 0.05 alpha-level, as seen in Table 215. In this case, students in the traditional 50-minute scheduled classes performed higher on the variable of scaled score on the Texas Assessment of Knowledge and Skills mathematics portion than students on the 8-block schedule. While these results were not statistically significant on a Levene's analysis of equality of variances, leading one to interpret that the independent variable, schedule type, had an effect on male students' performance on their performance on the Texas Assessment of Knowledge and Skills mathematics test in Teacher 10's Geometry course, this particular group also had a very small sample size. For the 8-block scheduled Geometry classes with Teacher 10 there were eight male students and for the traditional 50-minutes scheduled classes there were five male students. These very low sample sizes violate assumptions about analysis of covariance testing and therefore, it is difficult of form any conclusions about the effects of the schedule type on the students' performance on the Texas Assessment of Knowledge and Skills mathematics test. It could be that the independent variable had some effect, but given the small size of the sample, it is likely that the results are not valid and no definitive conclusion can be drawn from this data.

The fifth statistically significant result was generated for female students in Pre-Calculus Pre-Advanced Placement under instruction from Teacher 21. The significance test produced an F-value of 5.387, which was statistically significant with a p equal to 0.034, at the 0.05 alpha-level, as seen in Table 217. In this case, students in the 8-block scheduled classes performed higher on the variable of scaled score on the Texas Assessment of Knowledge and Skills mathematics portion than students on the traditional 50-minute schedule. The test results were also statistically significant on a Levene's analysis of equality of variances. The interpretation of this test is that the differences existing between the two groups prior to instruction were so great that they were not adequately controlled by the covariate in the analysis. While it appears that the independent variable, schedule type, had an effect on female students' performance on their performance on the Texas Assessment of Knowledge and Skills mathematics test in Teacher 21's Pre-Calculus Pre-Advanced Placement course, it may be the case that sizable differences existed between the two groups to the extent that the statistical significance of the results was not solely an effect of the schedule type on the performance of the students. In addition to the Levene's results, this particular group also had a very small sample size. For the 8-block scheduled Pre-Calculus Pre-Advanced Placement classes with Teacher 21 there were 5 female students and for the traditional 50-minutes scheduled classes there were 14 female students. The very low sample size on the 8-block schedule violates assumptions about analysis of covariance testing and therefore, it is difficult of form any conclusions about the effects of the schedule type on the students' performance on the Texas Assessment of Knowledge and Skills mathematics test. It could be that the independent variable had some effect, but given the small size of the sample, it is likely that the results are not valid and no definitive conclusion can be drawn from this data.

Summary of Conclusions and Discussion for Research Question 2

In terms of student performance on the Texas Assessment of Knowledge and Skills mathematics tests, teacher perception surveys indicated that teachers felt students perform better overall in traditionally meeting classes over 8-block scheduled classes. When the data were compared by use of analyses of covariance tests of significance the outcome clearly supports the conclusion that the schedule type has no effect on student performance on this measure. Of the 31 teachers' students compared none generated a statistically significant result at the 0.05 alpha level.

Analyses of covariance were also conducted for each mathematics course and grade level at a district aggregated level to determine any effects of the independent variable of schedule type on student performance on the Texas Assessment of Knowledge and Skills mathematics examination by high school campus or for the district sample. No statistically significant results were produced in these analyses. Given the lack of statistically significant results the only conclusion that can be supported is that schedule type does not have a statistically significant effect on student performance on the Texas Assessment of Knowledge and Skills mathematics tests for the students in the classes in McKinney Independent School District schools.

The data for student performance on the Texas Assessment of Knowledge and Skills mathematics tests were analyzed using analyses of covariance tests of significance for each ethnic subgroup. This data was generated for each teacher in the study and presented by course. A total of 93 analyses of covariance were conducted to determine any possible effect of the independent variable or schedule type on the performance of students on the Texas Assessment of Knowledge and Skills mathematics test by ethnic group population. One of the 93 significance tests one generated a statistically significant result. However, these results are considered invalid for use in this study given their significance on a Levene's analysis, and the fact that the small sample size violated the validity of the analysis of covariance test. Therefore, the only conclusion that can be supported is that the independent variable of schedule type has no effect on student performance on the Texas Assessment of Knowledge and Skills mathematics test for any ethnic subgroup population.

The data for student performance on the Texas Assessment of Knowledge and Skills mathematics tests were analyzed using analyses of covariance tests of significance for each gender subgroup. This data was generated for each teacher in the study and presented by course. A total of 62 analyses of covariance were conducted to determine any possible effect of the independent variable or schedule type on the performance of students on the Texas Assessment of Knowledge and Skills mathematics test by gender group population. One of the 62 significance tests five generated a statistically significant result; however, three of these tests also resulted in a statistically significant Levene's test and two of the five consisted of a low sample size resulting in the possible invalid results when interpreting statistical significance. One statistically significant analysis was free of either of the above issues, Teacher 18's Algebra I results. In this case the outcome showed an effect favoring the 8-block schedule. Given that one of 62 analyses can be useful in determining effects of the independent variable, the only conclusion that can be supported is that schedule type has no effect on student performance on the Texas Assessment of Knowledge and Skills mathematics test by gender group.

Conclusions and Discussion: Research Question 3

Introduction to Conclusions and Discussion for Research Question 3

In this section the conclusions and discussion for research Question 3 will be reviewed. Research Question 3 relates to student performance in terms of score on the Algebra I end-of-course assessment between students taking Algebra I courses on a traditional 50-minute schedule and students taking the same course on an 8-block schedule.

Conclusions and Discussion for Research Question 3

Research Question 3 states, is there a statistically significant difference in state developed end-of-course exam scores (EOC) between students taking Algebra I on a traditional 50-minute schedule and students taking Algebra I, from the same teacher, on an 8-block schedule?

Seven teachers of Algebra I across both high school campuses used in the research study taught students on both types of schedules. Students' scores on the state developed Algebra I end-of-course exam were compared for each teacher according to the two schedules using analyses of covariance. Student performance on the previous year Texas Assessment of Knowledge and Skills mathematics test were used as a covariate to control for any difference that existed between the two groups prior to instruction in their Algebra I course. As shown in Table 220, there were no analyses of covariance that produced statistically significant results for end-of-course test performance based on schedule type. This information supports the conclusion that the independent variable, schedule type, had no effect on student performance on the state developed Algebra I end-of-course examination.

In addition to comparing students by teacher, data were also aggregated at the campus and at the district level and compared by analyses of covariance to determine if the variable of schedule type had any effect on the students' performance at the campus or district level. The results of these analyses are presented in Tables 221 through 240. None of these significance tests provided statistically significant results, supporting the conclusion that the independent variable, schedule type, had no effect on student performance on the state developed Algebra I end-of-course examination.

Summary of Conclusions and Discussion for Research Question 3

In terms of student performance on the Texas Algebra I end-of-course Examination, teacher perception surveys indicated that teachers felt students perform better overall in traditionally meeting classes over 8-block scheduled classes. Analyses of covariance tests of significance were conducted for each Algebra I teacher and comparisons made between schedule types. Analyses were also conducted to compare aggregated groups of students across each high school campus and across the entire district sample. No statistically significant results were generated using the analysis of covariance comparisons. The only conclusion that can be supported is that schedule type does not have a statistically significant effect on student performance on the state Algebra I examination for the students.

Conclusions and Discussion: Research Question 4

Introduction to Conclusions and Discussion for Research Question 4

In this section the conclusions and discussion for research Question 4, a through d, will be reviewed. Research Question 4 relates to teacher perception of differences between classes that meet on the traditional 50-minute schedule and classes that meet on the 8-block schedule.

The 31 teachers included in the research study were each asked to respond to a brief survey regarding their perceptions of the differences between the 8-block schedule and the traditional 50-minute schedule. Fourteen of the 31 teachers responded to the survey. Their responses are summarized in Table 241.

Conclusions and Discussion for Research Question 4.a.

Research Question 4.a. states, is there a difference in teacher perception of benefit between the 8-block schedule and the traditional schedule in terms of student academic success?

Fourteen of the 31 studied teachers responded to this survey question. Of the fourteen respondents, 10 favored traditional scheduling in their perception of student success. Comments suggested that teachers felt that the daily meeting schedule allowed for their ability to present smaller amounts of information to students and those students are better able to retain information in smaller amounts than when they must cover twice as much on the alternate day 8-block schedule. Teachers' comments also suggested that when teachers met with students on a daily basis, as on a traditional 50-minute schedule, that they were better able to help students keep up with homework completion. Additional positive comments toward the traditional 50-minute schedule included that getting students caught up after a missed day is easier with less information lost, there are fewer discipline problems due to the short class periods, and that information is retained longer when it is reinforced daily.

Of the 14 teachers who responded to research Question 4.a. on the survey, two provided comments in favor of the 8-block schedule. Their comments included that the faster pace of the class helps them feel more is accomplished each class meeting, and that the teacher is better able to supplement the lesson with interactive, hands-on activities that enhance student learning with the extra class time each period. Overall the majority of teachers perceived that the traditional 50-minute schedule was better for students' academic success.

Conclusions and Discussion for Research Question 4.b.and 4.c.

Research Question 4.b. states, is there a difference in teacher perception of benefit between the 8-block schedule and the traditional 50-minute schedule in terms of teacher satisfaction?

Research Question 4.c. states, is there a difference in teacher perception of benefit between the 8-block schedule and the traditional 50-minute schedule in terms of teacher retention?

Fourteen of the 31 studied teachers responded to this survey question, which combined research Question 4.b. and 4.c. into one question. Of the 14 respondents, 6 favored traditional scheduling in their perception of teacher satisfaction and teacher retention. Comments made by the respondents suggest teachers felt they could slow the pace down more for students on the daily meeting traditional 50-minute schedule and were better able to accommodate student needs. They also indicated that they felt they were able to accomplish more on this schedule type as there is more time over the year and that sense of accomplishment lead to job satisfaction. Additional comments suggest that they felt better prepared for teaching on the shorter, daily periods, more organized, and more structured. They contribute this, along with the shorter periods, to fewer student discipline issues, which in turn lead to a better feeling of job satisfaction. Teachers who are satisfied in their work and find fulfillment from that work tend to continue teaching on that campus leading to increased teacher retention.

Of the 14 teachers who responded to research Question 4.b. and 4.c. on the survey, 2 provided comments in favor of the 8-block schedule. Their comments included that they felt that teachers could develop better relationships with students on the 8-block schedule since they spend longer periods of time each class meeting with students, and that having a longer period gave them time to go back over material if students needed a review before moving on, allowing the class to adjust to student needs. They also felt that the opportunity to do more hands-on activities, interactive activities with students, and projects in the longer class made teaching more enjoyable, thus leading to increased satisfaction with their career.

Conclusions and Discussion for Research Question 4.d.

Research Question 4.d. states, is there a difference in teacher perception of benefit between the 8-block schedule and the traditional 50-minute schedule in terms of fulfillment of curricular purpose?

Fourteen of the 31 studied teachers responded to this survey question. Of the 14 respondents, 8 favored traditional scheduling in their perception of the ability to accomplish their curriculum goals. Comments made by the respondents suggest teachers feel that the extra time over the course of a school year available with the traditional 50-minute schedule allows them to better meet all the curriculum standards set forth in their district and state curriculum requirements. They also felt that by meeting daily with students, that students were less likely to forget material taught in class. This increase in student retention of content learned makes teaching easier on a daily basis, but also supports a vertical curriculum as students move into subsequent mathematics courses. Additional comments also indicated that having the extra time over the academic year with the daily meeting classes makes it easier if a student misses a class or to catch up if a class is missed due to changes in the campus activity schedule. They also expressed that when the classes meet daily and seem to be more spread out over the course of the academic year, more time is available for re-teach and teachers are still able to meet all the curriculum objectives.

Of the 14 teachers who responded to research Question 4.d. on the survey, one provided comments in favor of the 8-block schedule. The comment suggested that by having more time available in each class meeting with the 90-minute periods, teachers are better able to incorporate the required hands-on, interactive student activities, projects, and technology included in the district curriculum.

Summary of Conclusions and Discussion for Research Question 4

In general the 14 teachers who responded to the survey on their perceptions of the two schedule types seemed to prefer the traditional 50-minute schedule over the 8-block schedule. While most would agree that there are some advantages to the elongated time in the 8-block class periods, they felt the most benefits for both students and teachers would be gained on the traditional schedule. Most agree that student success leads teachers to an increased sense of job satisfaction, which in turn aids in retention of employment. In addition, the ability to accomplish the goals of the curriculum is interconnected with student success and the sense of satisfaction teachers' gain from their work. A majority of the 14 teachers who responded felt that students perform better and mathematics achievement is improved on the traditional 50-minute schedule verses the 8-block schedule. A majority also agreed that they felt the most satisfied with their own job performance and that of their students when they reflected on the traditional 50-minute schedule.

Several teachers also took the opportunity to provide additional comments related to the scheduling methods. The majority of the feelings expressed in that section of the survey related to the desire for the school district to choose one schedule to use during the academic year rather than running both scheduling types concurrently. The majority of teachers agreed that having both schedules at the same time increased the work load, lead to a sense of unfairness at times among the staff, and was difficult to keep up with in terms of planning and preparation.

Summary

Overall data analysis for students in this research study indicate that schedule type has little, if any, effect on student mathematics performance. Academic performance was analyzed for both subjective measures such as teacher assigned course grades and for objective measures such as state criterion referenced achievement tests. The results of statistical tests led to results considered inconsistent at best and as having no effect at worst. Therefore, those critics and proponents of 8-block scheduling can neither be supported or refuted using this research.

Implications

School districts all over the country often debate which scheduling method will offer their students the most advantages, will be the most cost effective, and will be the best option for their situation. Currently many districts in Texas are debating the merits of traditional and 8-block scheduling options as the Texas State Board of Education has increased the required number of credits needed for graduation to 26. In doing so, the implications involve whether students can successfully earn all the required credits under a traditional schedule and still include athletics and other extra-curricular activities into the school day and student schedule of classes. This has sparked much discussion as districts re-evaluate which master schedule will be affordable both financially for the district and academically for students. Some schools that have recently chosen to move away from the 8-block schedule may now be reconsidering that schedule type as an option for their students.

While making a decision as important as the scheduling option that is best for students, data and research should be used to demonstrate the decision is based on sound merits. One of the things many districts consider is whether one schedule may impact student academic success in a course more than another. The implication of this particular research study finds that the variable of schedule alone does not make a difference in students' academic performance in mathematics. While further research should be conducted in other subject areas, school administrators may find the information contained in this body of research reassuring in that their choice between the traditional 50-minute period and the 8-block schedule will not likely impact their students' mathematics success.

If districts are considering teacher satisfaction and retention while considering which schedule type will be best for the school district, information contained in Table 241 may serve an important role. In general, teachers in this research felt that students benefit more from the traditional 50-minute schedule. They also expressed that they preferred the traditional 50-minute schedule for teaching as they felt they were better able to accomplish their goals with students, better able to handle student discipline, and better organized in their teaching preparation. All of these opinions contribute to a increased sense of teacher satisfaction and the likelihood that teachers will continue to be retained in their teaching assignment. This is an important consideration since teacher turnover can be expensive for a school district when recruitment and teacher professional re-training is considered.

Recommendations for Further Research

Further study is needed to determine any effects of block or traditional scheduling on all aspects of student performance. Limitations of this research include a narrow focus of population to one suburban school district, a narrow focus of time to one academic year, and a master schedule design that included both schedules administered concurrently during the school day. Recommendations for future research include:

1. Expansion of the population parameters to include a greater sample of students over a larger territory such as an entire region or state.
2. Expansion of the population parameters to include a more diverse population of students. Often statistical tests in this research were based on a very small population sample *n*, particularly when the data were analyzed by ethnic group.
3. Expansion of the population parameters to include a more specific focus on particular mathematics courses, such as Algebra I, or advanced courses, or only courses offered to 10th or 11th grade students.
4. Expansion of the study to include information collected on student performance over multiple years. By enlarging the time variable over multiple years, increases or decreases in student performance by schedule type could be investigated.
5. Expansion of the study to include situations where the master schedule was changed over a period of years from one schedule type, such as a block design, to another schedule type, such as traditional.
6. Expansion of the study to investigate the effects of schedule type in other content areas and in the non-core academic areas, such as fine arts. Very few studies exist in other academic and fine art subjects comparing block schedules to other schedule designs. It is conceivable that different schedule

designs may be better suited to one discipline over another. These study areas have yet to be explored.

7. Redesign of the study to allow longitudinal information to be collected on individual students over time where the scheduling design is changed. The greatest indication of the success of one schedule type verses another lies in tracking specific and individualized information over a long period of time rather than different students by teacher over time.

The purpose of this research was to add to the body of literature that exists regarding the effects of block scheduling on student achievement. Like the existing database of research documented in the review of the literature available, this research cannot support the conclusion that block scheduling has a significant impact on student performance in high school mathematics. Results of this study are consistent with other research existing in the field in that it is inconsistent at best regarding the nature of block scheduling and at times the data suggest that block scheduling is not beneficial for student performance. While many individual schools and school districts continue to make decisions about the implementation about block scheduling, they must use available data in order to make the best decision for students. Previously stated in this paper, a decision to move to a block schedule, or any schedule design, must be made based solely on the needs of the learner and in support of the learner's academic progress. A decision based on any other reason is not in alignment with the purpose of public schooling. And a decision based on anecdotal evidence and not on derived data or research available is not a sound one and certainly not the employment of data-driven decision making, the anthem of most school administrators.

For any school looking to make a decision related to scheduling methodology, this research will hopefully help to inform the process and lead to the vocalization of additional questions that should first be explored prior to any change in the student master schedule.

APPENDIX A

INSTRUCTIONAL HOURS BY SCHEDULE TYPE

Table A1

Instructional Hours by Schedule

A Day

Period	Hours	Time in Class
1	9:00 – 9:50	50 minutes
2	9:55 – 10:55	60 minutes (includes announcements)
3	11:00 – 1:00	90 minutes (excluding lunch)
4	1:05 – 2:35	90 minutes
5	2:40 – 3:30	50 minutes

B Days

Period	Hours	Time in Class
6	9:00 – 9:50	50 minutes
7	9:55 – 10:55	60 minutes (includes announcements)
8	11:00 – 1:00	90 minutes (excluding lunch)
9	1:05 – 2:35	90 minutes
10	2:40 – 3:30	50 minutes

Periods 1, 2, and 5 are the same classes and students as periods 6, 7 and 10 as they meet daily.

50 minutes times 178 instructional days = 8900 class minutes

Periods 3 and 8 and periods 4 and 9 alternate and meet every other day.

There are 90 A-days in 2004-05 and 88 B-days in 2004-05 according to the academic rotational calendar.

A = 90 minutes times 90 class meetings = 8100 class minutes

B = 90 minutes times 88 class meetings = 7920 class minutes

Average minutes = 8010

Traditional classes meet 8900 minutes per year.

Block classes meet 8010 minutes per year on average.

Difference between these is 890 minutes, or $14\frac{5}{6}$ hours.

Students in a traditional scheduled class meet $14\frac{5}{6}$ hours more per year than students taking the same course on the 8-block schedule.

APPENDIX B

McKINNEY HIGH SCHOOL MASTER SCHEDULE

Table B1

Master teaching schedule of included classes in the study - McKinney High School

Teacher ID	Course	Block period (s)	Traditional period(s)
1	Algebra I 0201	8	1/6
1	Algebra I (inc) 0200	3	2/7
2	Algebra I (inc) 0200	3, 4, 8, 9	1/6, 5/10
3	Algebra I 0200	3, 8	2/7
4	Algebra II PreAP (GT) 0206	4, 8	1/6
5	Algebra III 0207	3, 8, 9	1/6, 5/10
6	Algebra II 0203	4, 8	1/6
14	Algebra II PreAP 0205	3, 9	2/7
7	Algebra II (inc) 0203	3	2/7
8	Geometry 0210	4, 9	5/10
9	Geometry 0210	3, 4, 9	2/7, 5/10
10	Geometry (inc) 0210	8	1/6
11	Geometry (inc) 0210	3	1/6, 2/7
15	Geometry PreAP 0213	9	5/10
12	Geometry PreAP 0213	3, 4, 8, 9	2/7, (1/6)
13	Pre-Calculus PreAP 0219	8	2/7

APPENDIX C

McKINNEY NORTH HIGH SCHOOL MASTER SCHEDULE

Table C1

Master teaching schedule of included classes in the study - McKinney North High School

Teacher ID	Course	Block period (s)	Traditional period(s)
16	Algebra II 0203	8, 9	1/6
17	Geometry (inc) 0210	9	1/6, 2/7, 5/10
18	Algebra I (inc) 0200	3, 8	1/6, 2/7, 5/10
19	Algebra I (inc) 0200	9	1/6, 2/7
20	Algebra II PreAP 0205	4	5/10
21	Precalculus PreAP 0219	8, 9	2/7, 5/10
22	Algebra III 0207	4	1/6, 2/7
23	Algebra II PreAP 0205	9	5/10
24	Algebra I (inc) 0200	4, 8	1/6, 2/7, 5/10
25	Algebra I (inc) 0200	4, 9	1/6, 2/7, 5/10
26	Precalculus PreAP 0219	4	1/6, 2/7, 5/10
27	Algebra II 0203	3, 4, 8	5/10
28	Algebra II (inc) 0203	3, 8	1/6, 2/7
29	Geometry (inc) 0210	3, 8	1/6, 2/7
30	Algebra II PreAP 0205	3, 4, 8	2/7
31	Geometry (inc) 0210	3, 8	1/6, 2/7

APPENDIX D

SURVEY QUESTIONAIRE

INFORMED CONSENT NOTICE

The purpose of this research study is to investigate the effects of the different types of class meeting schedules on student achievement. In McKinney ISD there are currently two types of schedules running concurrently, traditional daily meeting classes and alternating day block (8-block design) classes. This research will attempt to uncover possible effects on student achievement related to the two different schedule formats.

You are being asked to complete a survey that will take about 15 minutes. Answering the questions in the survey involves no foreseeable risks. Participation is voluntary and you may stop at any time without penalty. By completing the survey you are giving consent to participate in the study. Results of the survey will be reported only on a group basis.

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This project has been reviewed and approved by the University of North Texas Institutional Review Board. Contact the IRB at (940) 565-3940 or sbourns@unt.edu is you have any questions concerning your rights as a research subject. You may print this Notice for your records.

Teacher Perception Survey of 8-Block and Traditional Schedules

List the subjects taught in your classes. ____

Briefly explain your opinion regarding the two scheduling types (block and traditional) that are running on our campus this year in terms of student academic performance.

Briefly explain your opinion regarding the two scheduling types (block and traditional) that are running on your campus this year in terms of teacher satisfaction and retention.

Briefly explain your opinion regarding the two scheduling types (block and traditional) that are running on your campus this year in terms of curricular purpose (i.e. meeting curriculum goals).

Please provide any other comments you wish to provide regarding the two scheduling types (block and traditional) that are running on your campus this year.

APPENDIX E

SURVEY RESPONSES

Survey Responses from Teacher Participants

Question 1: Briefly explain your opinion regarding the two scheduling types in terms of student academic achievement:

1. Prefer traditional because students need math every day in order to perform well on assessments. The block time (90 minutes) is too long for students because there is too much information presented at one time for students to take it all in. The day in between keeps students from learning the material (i.e. they forget it over the break between meeting days)
2. Experience in teaching on both schedules shows me that students seem to perform better in the block classes. They seem to have better averages. This may be due however to differences in ability and effort and not in terms of the schedule.
3. The traditional classes are at an advantage when testing since they have the opportunity to study after having taken half the test and the block can’t do that since they take the whole test in one period.
4. I have two similar classes meeting on each schedule. The traditional class consistently shows greater understanding of concepts and their average on tests is higher usually by 5% to 10%. The students in the traditional class also have been more likely to do homework and make up missed work from absences. Students in the block class, when they miss a day, miss twice as much material making it difficult to catch up. Several of the block students got behind and just never made up the work (because there was more)

5. I have found students performance better in the traditional classes. They had more time in class to work on assignments and get work done. They retained the information better. Those in the block classes did not focus as much on the class because they had it every other day – they tended to focus more on the work for their traditional classes that met every day.
6. Traditional – 50 minutes is not much time for instruction, hands on, technology, and homework review time. Block – the extended time is helpful in going over homework, supplementing lessons with experiments.
7. For typical lessons and practice I find the traditional better. I can hold the students' attention and assign more homework. Block scheduling is better for group activities and investigations. Overall I find I can do better with traditional. I larger percentage of the class is "effective learning" translating to better academic performance. Students seem to do better in my traditional classes.
8. (responded but did not address the question)
9. In the classes that I teach the type of schedule does not greatly influence academic performance. Most of my students are very responsible and take care of their performance without regard to the class schedule.
10. I can make either type of schedule work, but it's difficult with a mixture of the two. When we do projects, it seems that we compromise and come up with a schedule that can be adapted to either. Instead of perfecting the process for either a 50 minute or 90 minute class, we compromise. At the level I teach I think the student benefits from small daily segments. They get short practices more often and seem to have better success.

11. I believe that the students in the class on the traditional schedule perform better academically than those on the block. They receive more frequent instruction, they are presented with smaller amounts of information in each session, and they seem to retain more information when it comes time to test.
12. I understand the need to block schedules for the students have enough periods to take sports, music, electives. But I prefer the daily (traditional). Students today have more short-term memory, there are not asked to memorize or retain information Daily practice is needed to keep math concepts fresh and “fluid” in the brain. Math uses the same sensory brain areas as music, foreign language, and sports, practice is needed to learn it and keep it.
13. For math, the low to average students need every day math instruction.
14. I feel the daily classes do much better for several reasons. They do not have to budget their time as well as someone on the block. The daily students have more class time which means more time to do homework and ask the teacher questions during class.

Question 2: Explain your opinion regarding the two scheduling types in terms of teacher satisfaction and retention:

1. Prefer the traditional schedule because there is too much to try and cover in each period and students do not retain it as well.
2. I was in greater favor of block scheduling prior to this year but now am not as confident in that response.

3. I don’t think anyone likes the two schedules running at once. It is challenging and creates difficulties for teachers. Retention is a personal issue that may or may not be related to a schedule.
4. I think most teachers prefer the traditional schedule. I don’t think it affects retention. Teachers who have conference on the block like that. (Because it is a long period off)
5. I personally like teaching the traditional classes better. I was able to accomplish more in the classes meeting daily. I found it difficult to keep the classes (on different schedules) in the same place in the curriculum. Even though I only teach two subjects, I felt like I had four preparations since both were taught on block and traditional schedules.
6. I believe the students learn better on the block schedule and teachers get to know the students and how they learn better. With 50 minutes I can only hope the students get it. I rely heavily on tutorials for those students and kids won’t come. I have little time for hands on activity
7. I feel more satisfied with my success in traditional classes. Disruptive students cause fewer problems in the shorter classes because I have their attention more effectively. My teaching must be more structured, planned, and effective for a shorter period. There are more classroom management issues in the longer classes causing less satisfaction and enjoyment.
8. Block scheduling is great for projects and tests. Tests tend to always go over time in the traditional classes. However, the traditional classes retain more and their assignments are completed more accurately.

9. My personal preference would be to have either schedule but not the mixture. I do not like planning to teach the same curriculum for both a blocked class and an everyday class. I cannot, however, say what the effect is on the retention of teachers.
10. Most teachers I talk to don't care for this mixture of schedules. Some want 90 minutes, and others want 50 minutes, so neither is satisfied. I haven't heard from any one who has based a transfer on the schedule, but it may be a factor in their decisions.
11. I personally prefer my classes that are on the traditional schedule. I see those students more frequently and I'm more relaxed with them because I 'm not trying to cover as much material in one session.
12. It is a very lop sided affair. It is almost like having two preparations for the same course when teaching both traditional and block classes. Much more difficult in evening out time allowed for tests, quizzes, etc. Some teachers with 90 minute preparations everyday are getting more time than teachers with 50 minutes every day. This has caused some resentment.
13. As a teacher, I feel block is beneficial in many ways. Teach, practice/activity, time/homework. But I notice lower level students doing better overall with traditional.
14. My daily traditional classes have generally scored from five to ten points higher on every quiz/test than my blocked students. When I have a lab to do in class, the block is nice but not worth the overall time I would lose if the class were blocked.

Question 3: Explain your opinion regarding the two scheduling types in terms of curricular purpose:

1. Goals are met as far as covering all the content, but on the block, too much must be covered in each class in order to accomplish the curriculum goals making it harder to be effective
2. Traditional schedules provide more time for teachers and students to meet all the curriculum goals
3. I believe the traditional is better for student retention of material. Because there is not a day in between class meetings, there is less opportunity to forget material.
4. I feel I was able to accomplish more in the traditional classes then in the block because make of the students were only able to handle learning one concept a day no matter how long the period. This is partly due to the maturity and ability to pay attention for a long period of time, but they learned better if I taught a concept or skill and then had time to reflect on and practice just that one think. The block classes seemed frustrated and confused most of the time and more time was spent answering questions from a previous lesson allowing less time for a new lesson.
5. I was able to teach the entire required curriculum on both schedules. It was difficult because it felt like four preps.
6. With traditional classes each unit was rushed. Occasionally we would slow down to ensure retention and got behind which rushed us more through the next unit. The block kids had more time to work on objects and really used activities and technology.

7. Due to student retention and attention spans, and ability to give more homework, I believe traditional scheduling is better and more effective in covering curriculum goals. There is less wasted time and more effectiveness per session. The shorter periods lend themselves to covering a topic. Student attention spans for the shorter period are reasons for more effective curriculum coverage.
8. Both schedules cover the material and there are successful students in both classes. One of the everyday classes is about half GT (gifted and talented). They would excel in either situation. The longer classes give more time for individual help.
9. I think the block schedule is better suited to upper level classes. Younger students need the exposure that a traditional schedule provides.
10. We do not have a common planning time this year and we didn't have one under the all block schedule. Under this system some get a 50 minute planning and other a 90-minute, which can lead to resentment.
11. I prefer the traditional schedule mostly because you see the students more frequently. Most students can only absorb so much material in one sitting and they need to practice one skill before they go on to another skill. With the block schedule, we try to teach two concepts in one period and students don't learn either one as well.
12. Block loses 50 minutes of time per semester per class for instruction. Time is shorter, must cut lessons out to make it fit. We have found it harder to meet during the day as a team for planning.

13. Teachers can teach regardless of the scheduling. What is better for the student should be the overriding reason.
14. I feel it is easier to meeting goals on the traditional simply because if you lose your class for an assembly you have lost 50 minutes of teacher’s time and not 90 minutes.

Additional comments:

1. I would prefer we had one schedule or the other, but not continue to run them both. It is difficult to keep the different classes together in the same content. The traditional classes tend to move faster through the material
2. With the two schedules, this does not allow for smooth lesson planning between the same classes on different schedules.
3. I like having a conference on the long block period
4. The block scheduling is better for students. Teachers have time to work individually with students and collaborate with other teachers.
5. I would like to have all traditional classes. Group activities could be broken into segments for effective use. Overall when considering classroom management issues, student attention spans, student misbehavior frequencies, and the added homework I am able to give, traditional scheduling works best for me. I think it you survey grades, this will be borne out.
6. I prefer the longer block for having the extra day for grading papers and planning. However, on spite of my preferences, the everyday classes seem to be the most successful.

7. As stated before, I feel that we should have either a block or traditional schedule, but not both.
8. There are advantages and disadvantages to both, but it really comes down to the teacher. Good teachers teach no matter whet the schedule. I prefer consistency to the current schedule.
9. I believe the traditional schedule is better for math classes than block. There are a few advantages to the block schedule (more time for tests, activities, labs, etc) but I believe that those are outweighed by the lower academic performance of the majority of the students on the block schedule.
10. If we go daily, we need 45 minute lunches for students and teachers. We must decide on a schedule. The mixture causes stress for teachers and students.
11. After teaching seven years on the old block and now on the modified block, I think it is much less stressful on teachers on the old scheduling system. On the other hand, I think meeting everyday for math benefits the students more.
12. I have always enjoyed the block scheduling, but our schedule this year has allowed me to compare student's success on both schedule and I was surprised at how much better my daily class performed in comparison to all of the blocked classes. Obviously there could be some confounding variables such as more GT (gifted and talented) students in one class than another, etc.

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